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SOVIET DEFENSE EXPENDITURES AND RELATED PROGRAMS 1935

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HEARINGS

BEFORE THE

SUBCOMMITTEE ON GENERAL PROCUREMENT

OF THE

COMMITTEE ON ARMED SERVICES

UNITED STATES SENATE

NINETY-SIXTH CONGRESS

FIRST AND SECOND SESSIONS

NOVEMBER 1, 8, 1979; FEBRUARY 4, 1980

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CONTENTS

CHRONOLOGICAL LIST OF WITNESSES

NOVEMBER 1, 1979

Page

Lee, William T., author of "Soviet Defense Expenditures, 1955–75" 3
Huffstutler, R. A. E., Director, Strategic Research, Central Intelligence Agency 29
Burton, Donald, Chief, Military Economics Division, Central Intelligence Agency 31

NOVEMBER 8, 1979

Vorona, Dr. Jack, Deputy Director for Scientific and Technical Intelligence, DIA, accompanied by Gordon Negus, DIA officer; Robert Leavitt, economist, DIA; Kenneth E. Giesen, and Maj. Bill Wise, Legislative and Public Affairs, DIA 58
Rosefielde, Steven, associate professor of economics, University of North Carolina 98
Lee, W. T 111
Burton, Donald, Military Economics Analysis Center, Office of Strategic Research, Central Intelligence Agency, accompanied by James Barry, Paul Welsh, Derk Swain, Robert Abbott, and Robert Andrews 115

FEBRUARY 4, 1980

Brady, Lawrence J., former Deputy Director, Office of Export Administration, Department of Commerce 135
Knowles, Kent, Director of Office of Export Administration, Department of Commerce 152
Connally, Sharon B., Director, Compliance Division, Office of Export Administration, Department of Commerce 166
Lucciola, Joseph, Deputy Director, Compliance Division, Office of Export Administration, Department of Commerce 167
Garber, Vitalij, Deputy Under Secretary of Defense, International Programs and Technology, Office of the Under Secretary of Defense for Research & Engineering, DOD 170
Frost, Ellen L., Deputy Assistant Secretary, International Economic Affairs, DOD 187
Deerlove, Lt. Col. James, Military Intelligence Officer, Defense Intelligence Agency 205

This is the printed record of hearings held by the Subcommittee on General Procurement November 1 and 8, 1979, and February 4, 1980, as transcribed by the official reporter, with minor typographical and grammatical corrections. It is the committee's practice to permit only such corrections to original testimony. All information subsequently submitted for the record is specifically identified as such and when included is set in a different size type.

Mr. Steven Rosefielde, whose testimony begins at page 98, has advised that the official reporter's transcript of the testimony which he gave on November 8, 1979, contains many substantive errors which misrepresent his views. Further, Mr. Rosefielde requested that all material submitted by him subsequent to the hearing be returned to him and that it not be included in the printed record. Consequently, only Mr. Rosefielde's prepared statement and his oral testimony, which were presented to the subcommittee the day of the hearing, appear in this volume.

SOVIET DEFENSE EXPENDITURES AND RELATED PROGRAMS

NOVEMBER 1, 1979

U.S. SENATE,
SUBCOMMITTEE ON GENERAL PROCUREMENT
OF THE COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The subcommittee met, pursuant to call, at 9 a.m., in room 1114, Dirksen Senate Office Building, Senator Harry F. Byrd, Jr. (chairman) presiding.

Present: Senators Byrd, Warner, and Jepsen.

Committee staff present: Rhett B. Dawson, counsel; John T. Ticer, chief clerk; George H. Foster, Jr., and Don L. Lynch, professional staff members; Lynn E. Cowart and Ann Sauer, clerical assistants.

Also present: Frank Gaffney, assistant to Senator Jackson; Frank Krebs, assistant to Senator Cannon; Quentin Crommelin, assistant to Senator Byrd; and Christopher Lehman, assistant to Senator Warner.

Senator BYRD. Nine a.m. having arrived, the subcommittee will come to order.

The Subcommittee on General Procurement of the Senate Committee on Armed Services is convened today to receive testimony on recent Russian military procurement and on expected trends in Russian weapons procurement during the 1980's.

As the decade of the 1970's draws to a close, commentators on Soviet military policy have reached near unanimity in a general conclusion that the 1970's represent a period of massive Russian military buildup. Differences of course exist with respect to the nature and purpose of this buildup, but virtually all students of Soviet military policy are convinced that the past 10 years do encompass a surge in weapons acquisitions in Russia of unprecedented proportions during peacetime.

In my view, an accurate assessment of U.S. military procurement requirements must take account of both the degree and kind of Russia's weapons procurement since, inevitably, our own military procurement decisions must be based, at least in part, on an accurate estimate of the level of the potential threat to the United States posed by foreign nations and chiefly by Russia.

The purpose of this investigation, therefore, is to establish the true dimensions of Russian military expansion of the past decade and to attempt to project the level of economic and industrial effort which Russia will devote during the 1980's to weapons procurement and military activity generally.

As chairman of the Subcommittee on General Procurement, I believe it is very important for the subcommittee, in preparing to review the fiscal year 1981 procurement budget of the Department of Defense in those areas within the jurisdiction of the subcommittee, to know the facts both with respect to the merits of those programs proposed for approval by the subcommittee and with respect to the need for those programs in relation to the threat they seek to counter. I believe also, that it is important for the American people to have accurate understanding of the reasons for the defense programs found necessary for our national security.

The American taxpayer this year will be required to fund defense programs totaling in excess of $123 billion. The bulk of these funds are required for personnel costs and for operations and maintenance. Nevertheless, a substantial amount, over $41 billion, will be required for purchase of military hardware and for weapons research and development.

So it is important for the Members of Congress to understand, and for the American people to understand, the nature of the weapons acquisitions to be approved, the reasons those acquisitions are necessary and the military strength of our potential adversary.

I feel, too, that the Congress and the American people should not be lulled into a sense of complacency by negotiations with Russia for arms control and arms reduction. In short, the people and the Congress should have the facts, and the subcommittee in these hearings, today and on November 8, will attempt to help in establishing those facts and making them accessible for review.

This morning the subcommittee will hear testimony from Donald Burton, Chief of the Military Economics Division of the Central Intelligence Agency, and from William T. Lee, a widely respected student of Soviet procurement policies and of Soviet economic activity in the military sphere. Mr. Lee is author of the excellent book, Soviet Defense Expenditures, 1955–75, which was published 2 years ago. Mr. Burton has served in his present position for several years and has a long and distinguished career in Government as an analyst of Soviet military economics.

So, we are indebted to both gentlemen for their attendance, and look forward to their testimony. I remind both that this hearing is in open session. In the event either witness wishes to expand on a response to a question by supplementing it with classified information, such information could be provided to the subcommittee for the record and given appropriate classification.

The first witness was to be Mr. Burton, Chief of the Military Economics Division of the CIA. This committee always starts on time, and since Mr. Burton is not present, we will change the order of witnesses and ask Mr. Lee if he will come to the witness table first.

Good morning, Mr. Lee.

STATEMENT OF WILLIAM T. LEE, AUTHOR OF "SOVIET DEFENSE EXPENDITURES, 1955–75"

Mr. LEE. Good morning, Mr. Chairman.

Senator BYRD. We are glad to have you with us this morning.

Mr. LEE. It is a pleasure to be here, sir. I wish to express my gratitude for the opportunity to testify before your committee.

Senator BYRD. You are regarded as a top expert on Soviet plans and expenditures.

Mr. LEE. Mr. Chairman, I don't like to use the word expert. It has been defined as unknown quantity and water under pressure. I prefer to refer to myself as a student of the problem.

Senator BYRD. Very well. We will proceed along that line. You may proceed as you wish.

Mr. LEE. Thank you, Mr. Chairman.

I would prefer not to read the statement I have submitted. I prefer to comment on the figures and graphs in it.

Senator BYRD. Your statement will be printed in full in the record.

Mr. LEE. Thank you, sir.

[The prepared statement follows:]

TRENDS IN SOVIET WEAPONS PROCUREMENT AND DEFENSE EXPENDITURES, 1955–80

INTRODUCTION

Many aspects of the Soviet military buildup have been reported in the press, usually in accounts of yet another new weapon system being developed or deployed. A few studies such as those by John Collins of the Legislative Reference Service have integrated much of the information on weapons deployment and compared Soviet with U.S. and NATO forces. The strategic nuclear balance has been analyzed and debated in great length and from many points of view, particularly during negotiation of the SALT II Treaty and as the debate in the Senate approaches. Less attention has been given to how much the buildup has cost the Soviets to buy all this weaponry that is the source of so much debate and concern.

This paper attempts to summarize Soviet expenditures for procurement and defense over the past twenty-five years, provide some appreciation of the impact on the Soviet economy, outline the likely Soviet rationale for spending so much money on defense, and make a few comparisons with CIA estimates.

LIMITS OF THE EVIDENCE

The USSR publishes virtually no information directly relating to weapons procurement beyond pictures of parades, unit training, and an occasional film. It is necessary, therefore, to keep in mind some of the limits of the evidence and the methods used to estimate Soviet outlays for procurement and defense.

First, numbers and characteristics of individual Soviet weapons systems are provided almost entirely by the "national means of verification." There are many gaps in the data provided by these collection systems.

Second, the CIA estimates the distribution of Soviet defense expenditures, according to its direct costing methodology, by major mission and by branch of service. In 1975–76, the CIA was forced by new evidence to double its estimates of Soviet defense expenditures in 1970. By 1980 CIA estimates of total Soviet defense expenditures once again are understated by a factor of two.

CIA estimates of expenditures by major mission and by branch of service probably are even less reliable than its estimates for total outlays.

Third, total Soviet defense expenditures, in rubles, can be derived from published Soviet economic data within a tolerable degree of uncertainty. The trend (growth rate) of these expenditures over time are more reliable than the magnitude for any given year.

Fourth, Soviet outlays by major mission and by branch of military service cannot be derived from published Soviet economic data. The latter provide the basis for distributing total expenditures by only three components: procurement; pay, maintenance, operations and military construction; and, research, development, test and evaluation. Nevertheless, reasonable judgments can be made concerning major shifts in funding by major mission and, to a lesser extent, by branch of service.

The estimates of Soviet expenditures presented in this statement are derived entirely from published Soviet economic data which have proven to be, when properly understood, the only reliable source of such estimates. Outlays for weapons procurement are the most reliable component of Soviet defense expenditures derived from Soviet economic data.

Data on specific Soviet procurement programs are taken from various unclassified publications. Directly or indirectly, most such information is derived from the "national means of verification."

TRENDS IN U.S.S.R. OUTLAYS FOR DEFENSE AND PROCUREMENT: 1955–80

Figure 1 presents the growth in Soviet expenditures for defense and for procurement of weapons since 1955. The underlying data are in Soviet constant 1955 prices for the period 1955–1966, and in Soviet constant 1970 prices for the period 1966–1980. (Figure 1 plots the mid-point of these estimates, in percentage terms where 1970 equals 100). These data include civil space but do not include pensions of retired military personnel, most civil defense outlays, pre-military training, some education and medical costs, and possibly some transportation charges.

Two independent checks on these estimates from Soviet sources are available in the public domain: 50 billion rubles for 1970 and about 58 billion for 1972. Both independent checks from Soviet sources corroborated the high side of the estimates presented herein, and the methodology used to estimate U.S.S.R. outlays for procurement and operational expenses.

The 50 billion ruble figure for 1970 forced the CIA to double their estimates (in 1970 prices). However, this new evidence did not provide any information on how to correct the CIA methodology which remains unchanged.

Figure 2 presents the mid-point of my procurement estimates for the period 1976–1980, in billions of 1970 rubles as the Soviets reckon constant prices. The full cost of technological advances in weapons introduced after 1970 is included in these (Soviet) data.

Note the brief decline in outlays for defense (Figure 1) and procurement (Figure 2) in the mid-1950's after the Korean War, followed by rapid growth since 1957–1958, except for 1964–1965. The periods of most rapid growth in both defense and procurement outlays occurred in 1959–1963 under Khrushchev and in 1966–1970 under the Brezhnev-Kosygin regime. In the former period defense outlays grew at about 11 percent per annum and in the latter period about 13 percent annually. In 1958–1963 procurement more than tripled while it increased about 2.5 times in the 1965–1970 period.

In the period 1962–1972 the sheer weight of metal in the military establishment—everything from hinges on barracks' doors to missiles—grew at about eight percent per annum. This implies a growth of more than six percent annually in the cost of technological complexity and innovation incorporated into new and improved weapons systems. This increase in cost of Soviet weapons systems due to design and technological change appears very similar to increases in costs of U.S. weapons systems as a result of the same factors.

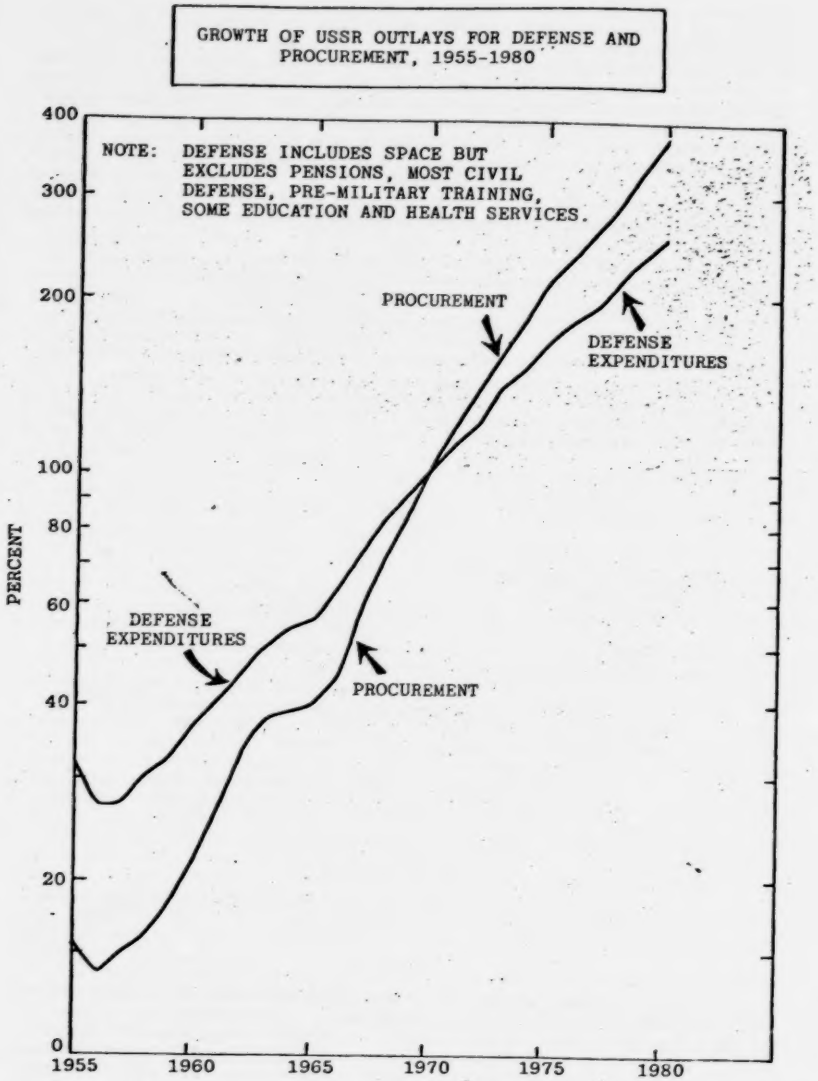

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FIGURE 1

The brief decline in both total outlays and procurement in the mid-1950's was the result of the end of the Korean War and the reorientation of the Soviet military establishment to the nuclear age. Subsequently, the growth in outlays shown in Figures 1 and 2 has resulted from the quantitative and qualitative

increases in Soviet military capabilities required by Soviet political and military objectives in the nuclear age.

During the late 1950's and during most of the 1960's most of the money went to modernize and expand both strategic offensive (Strategic Rocket Forces, Long Range Aviation and Navy SLBM's) and defensive (National Air Defense, Navy SLCM's) forces. Lesser emphasis was placed on new weapons for the Ground Forces and Frontal Aviation during this period. All services received nuclear warheads, new missiles, aircraft and other hardware but the strategic forces received the lion's share. Beginning in the late 1960's and continuing through most of the 1970's improvements in strategic offensive forces, Ground Forces and Frontal Aviation accounted for most of the growth in Soviet defense and procurement outlays.

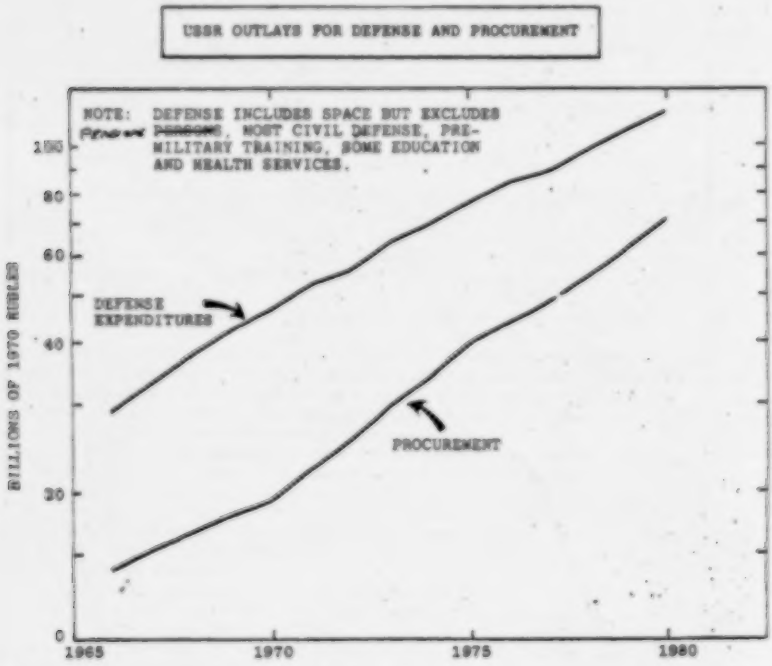

FIGURE 2

In the 1980's the emphasis is shifting to strategic defenses (Navy ASW surface ships and submarines and National Air Defense), with continued major improvements in Ground Forces and Frontal Aviation likely. Modernization of Strategic Rocket Forces and Long Range Aviation will continue to be expensive but strategic defensive outlays probably grow more rapidly than offensive force budgets in the 1980's.

From the information available in the public domain it is possible to construct a representative list of major Soviet procurement programs in the 1960's and 1970's. The list is not complete, of course, because much information is not available in the public domain. The intelligence community can count major additions to the visible inventory but such numbers cannot be equated to reliable estimates of Soviet weapons production. It is one thing to count the number of missile launchers deployed, but quite another thing to determine how many missiles have been produced. Much procurement, such as ammunition

production, simply cannot be counted by national means of verification. But the following list of visible acquisitions should help the reader to understand the high rates of growth shown in Figures 1 and 2, remembering that unit costs for each successive generation of weapon systems have been rising due to increasing complexity and the cost of technological innovation.

Thus, in the period 1958–1970 the Soviet military establishment procured:

Some 700 IR/MRBM launchers and associated support equipment, several times that many missiles and nuclear warheads.

About 220 ICBM launchers—support equipment, additional missiles and warheads.

The majority of their 10,000 SAM launchers, 6,000 radars, who knows how many missiles, and large quantities of equipment for command, control and communications (C–3).

At least 1,500 and probably about 2,000 interceptors, thousands of air-to-air missiles (AA–1 through AA–5), and large quantities of C–3 and support equipment.

41 first generation nuclear powered missile submarines—32 E-class cruise missile SSN's and 9 H-Class ballistic missile submarines.

39 diesel powered missile launching submarines—23 G-Class ballistic missile and 16 J-Class cruise missile boats.

About 14 Y-Class ballistic missile submarines.

Some 100 heavy and at least 1,000 medium bomber aircraft for the Long Range Aviation (LRA) armies and a large number of air-to-surface missiles—AS–1 through AS–6—for these bombers.[1]

About 15 first generation nuclear powered attack submarines (N-class and V-class) primarily for strategic anti-submarine warfare (ASW).

Some 40 large surface ships (3,800 to 18,000 tons loaded) for open ocean operations, since 1960 primarily for strategic ASW operations.

Probably about 2,000 tactical fighters and fighter bombers for Frontal Aviation (FA), some 1,000 transports for Military Transport Aviation (VTA) and several thousand helicopters for FA and VTA.

Several hundred launchers and many more missiles for air defense of Soviet Ground Forces in the field—SA–2, SA–4 and SA–6.

At least 20,000 possibly 40,000 or more tanks, several tens of thousands of other armored vehicles (mostly wheeled) and several thousand, probably more than 10,000 artillery pieces and large mortars.

On the order of 300 tactical missile launchers (SCUD's) for nuclear and chemical fire support of Soviet-Warsaw Pact Fronts and armies and around 500 tactical rocket (FROG) launchers for nuclear and chemical fire support of Soviet-Pact divisions. This in turn requires procurement of several thousand—no one in the West knows how many—missiles and rockets.

The list of major weapons procurement since SALT began (and through 1980) also is rather impressive:

Several hundred later model SS–11's with multiple warheads, 700 to some 800 third generation large, liquid fueled ICBM's (SS–17, 18 and 19) with MIRV warheads, some 250–300 mobile SS–20 MIRVed IRBM launchers (probably about 1,000 missiles), on the order of 8,000 to 10,000 nuclear warheads;

About 20 Y–Class and 30 D–Class SSBN's with a total of some 700 missile tubes, probably the 1st ship of the "Typhoon" class SSBN, and one to two thousand nuclear warheads;

At least 150 Backfire bombers, several hundred ASM's for this and older model bombers, and a corresponding number of nuclear bombs and warheads.

More than 60 major surface ships, mostly for strategic ASW operations, and other lesser combatant and support ships for a net increase of over 1,000,000 metric tons (after retirements) in the surface ship Navy, many hundreds to several thousand rockets, cruise missiles and (naval) SAM's; some 20 to 25 nuclear powered attack submarines—equipped with anti-ship cruise missiles;

More than 1,100 SAM (SA–3 and SA–5) launchers, perhaps 10,000 or more missiles; more than 1,000 high performance interceptors, some with an initial "look-down-shoot-down" capability, several thousand air-to-air missiles; these deployments in turn must have required a large investment in new radars, equipment for the ground control environment and probably a large number of nuclear warheads; at least two over-the-horizon radars;

[1] Allows for bombers procured prior to 1958.

About 1,000,000 men added to active duty military personnel and about 20 divisions (about equal to the entire U.S. Army) to the Ground Forces; about 30,000 tanks, more than 30,000 armored personnel carriers and other armored vehicles, more than 20,000 artillery pieces and heavy mortars;

Some 2,100 interceptors, fighter bombers and high performance, reconnaissance aircraft for Frontal Aviation; about 600 helicopter gunships; who knows how many thousands air-to-surface and anti-tank missiles;

At least 1,750 to 2,000 SAM launchers (SA–4, SA–6 and SA–8) for Ground Force air defense, and thousands of missiles; more than 2,500 SA–9 (Redeye type) launchers and corresponding numbers of missiles; on the order of 2,500 ZSU–23/4 anti-aircraft guns.

About 250 large (AN–22 and IL–76) transport aircraft and more than 1,000 cargo/troop transport helicopters.

Once again we must remember that such litanies are merely: (a) what can be detected by the so-called "national means of verification"; and (b) that portion thereof which is available in the public domain. Much is missing from this list.

As a result of all the new weaponry being acquired, procurement has risen rapidly as a share of Soviet defense outlays as shown in Figure 3. RDT&E and space have remained an essentially constant share at about 25 percent of Soviet defense expenditures. Although outlays for pay, operations, maintenance and military construction (POMC) have risen absolutely, the rate of growth has been slow compared to procurement and RDT&E. Hence the share of pay, operating costs and military construction have declined markedly as a share of total defense expenditures as shown in Figure 3.

Two factors appear to be driving the declining share of POMC: the low (direct) cost of conscripts and Soviet training and maintenance practices. Soviet conscripts are well fed (by Soviet standards) and well clothed but are paid less than the price of a bottle of vodka per month. Conscripts probably constitute more than 70 percent of the Soviet Armed Forces. Officers are very well paid but their compensation probably grows at about the same rate as civilian workers. Consequently, manpower costs grow steadily but slowly.

Soviet training practices emphasize use of training vehicles and weapons rather than unit equipment whenever possible. Soviet military aircraft fly fewer hours and Soviet ships steam fewer miles each year than their U.S. counterparts. These practices keep operating costs down and make it possible to maintain a high percentage of unit equipment in reliable operating condition. It is generally thought, however, that such practices result in lower unit proficiency. But it is one way of keeping operating costs down and unit equipment reliability up.

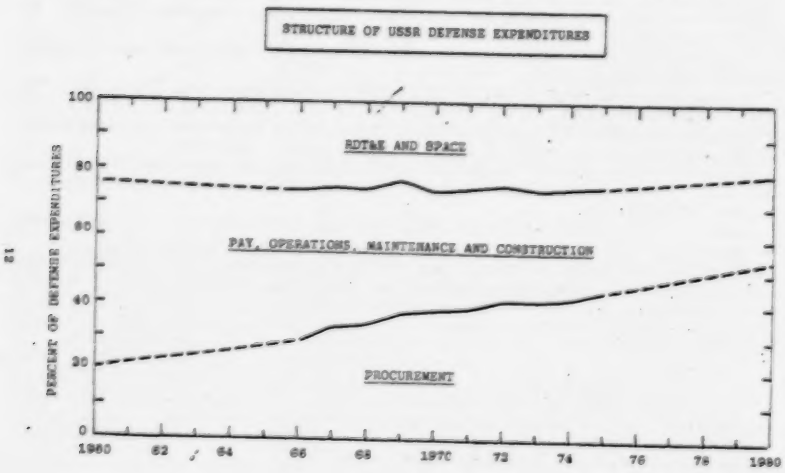

FIGURE 3

The decline in direct manpower costs (excluding pensions) has been dramatic, from about 25 percent of defense expenditures in 1960 to about 15 percent in 1970 and about 10 percent currently. Adding pensions would increase the share but would not alter the trend significantly. In terms of the opportunity cost, i.e., what the conscripts would have produced if employed in the Soviet economy, of course, the economic cost of Soviet military manpower is quite high. But the military budgeteers manpower costs increase slowly and take a smaller share of total outlays each year.

ECONOMIC IMPACT

Figures 4 and 5 present two gross measures of the impact of Soviet defense expenditures on the economy, the share of GNP devoted to defense and the allocation of machinery output between civilian and military uses. Defense expenditures reached about 12 percent of Soviet GNP in 1955, declined to about 9 percent in 1957–1958 and then began to rise, reaching 10 percent in 1960, more than 12 percent in 1970, nearly 15 percent in 1975, and will be about 18 percent in 1980. Defense's share has risen more rapidly in the 1970's than in the 1960's because the growth of the economy has declined more than the growth of defense expenditures.

The projections to 1980 shown in Figure 4 were based on the resource allocations specified in the 10th Five Year Plan (FYP) as announced in 1976. Whereas previously the increasing share of defense had been largely at the expense of consumption, the 10th FYP called for unprecedented (peacetime) cuts in investment's share of GNP in order to finance continued rapid growth in defense outlays. Consumption's hare was to remain constant at about 54 percent of Soviet GNP—see Figure 4.

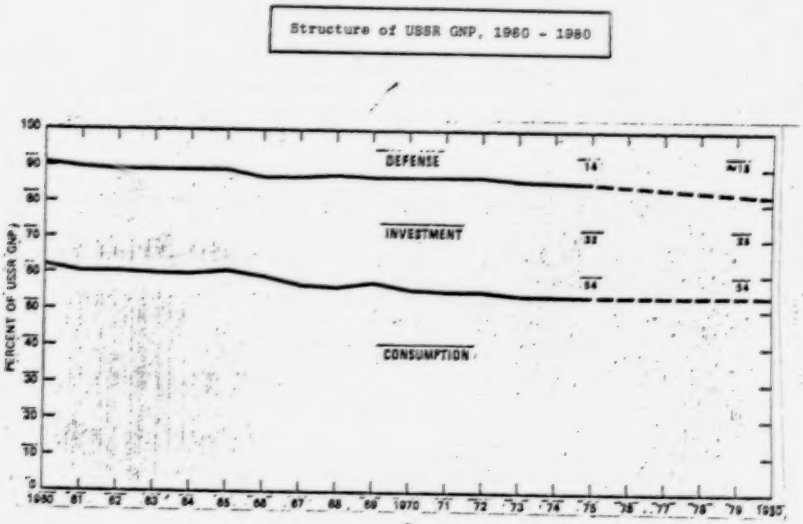

FIGURE 4

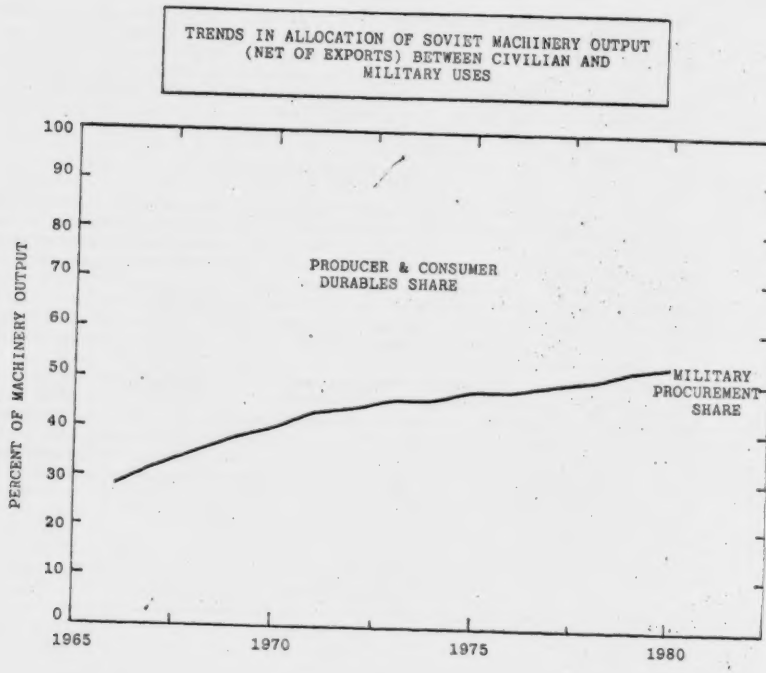

FIGURE 5

In 1976, 1977 and the annual 1978 plan (as originally published) the Soviets followed the 10th FYP schedules. However, in the course of 1978 and in the 1979 annual plan (as published) the Soviets modified their policy. Consumption is being cut once again (as a share of GNP) and it appears that investment may decline only about two percentage points (to about 30 percent) of GNP instead of the 4 point cut originally planned. Defense outlays appear to be on the original schedule and will reach about 18 percent of Soviet GNP in 1980.

Another measure of the economic impact is procurement's share of total Soviet machinery output as shown in Figure 5 (computed from procurement in 1970 prices). From about 25 percent in 1965, procurement rose to 40 percent of Soviet machinery output in 1970 and will be over 50 percent in 1980. The Soviets have offset this impact by buying more and more machinery and equipment from Eastern Europe and lately from the West. In 1980 imports probably will constitute at least 30 percent and perhaps as much as 44 percent of all machinery and equipment allocated to U.S.S.R. capital investment. Meanwhile the consumer's share of Soviet machinery output is being held to about 11 percent instead of rising to about 13 percent.

The growing share of GNP allocated to defense as well as increasing defense claims on machinery output are the principal, although by no means the only, factors behind the declining rate of Soviet economic growth. Unfortunately, there is no way at the present time to quantify the opportunity cost of Soviet defense outlays i.e., the economic growth and consumption that has been foregone in order to finance the defense build-up. True, the U.S. government has

spent a considerable amount of money for an econometric model of the Soviet economy. But that model has yet to estimate either GNP or defense outlays accurately, to say nothing of estimating the opportunity cost of defense expenditures at any level.

During the 1970's foreign trade has been a critical element in the growth of Soviet procurement and defense outlays. As more and more domestic resources have been shifted to weapons production the Soviets have compensated to a large degree by increasing machinery imports. Profits from foreign trade have permitted the Soviets to balance their domestic accounts. Much of this trade has been financed by loans and credits advanced by the U.S. and NATO countries. Seldom, if ever, have the nations against which a massive military buildup is directed done so much to finance it. OPEC price increases and the rise in gold prices related to the decline in the value of the dollar also have made a major contribution to Soviet ability to use foreign trade to offset the domestic cost of their military programs.

RATIONALE FOR THE DEFENSE BURDEN

Why are the Soviet leaders willing to spend so much on defense? Sufficient reasons seem readily apparent. Keep in mind that decisions on weapons acquisition and defense spending are made by the Party leaders. Obviously the Minister of Defense presents the case for what the military would like but the Politburo makes the decisions and issues the directives on weapons system acquisition policy in the name of the Central Committee. Now for a few of the obvious reasons the Party leaders are willing to burden the economy so heavily.

First, the Soviet leaders believe in the political utility of military power. They view their foreign policy as generally successful (more pluses than minuses) and believe that their growing military power has been one essential element in that success. When the Soviets and/or their clients can intervene with military aid and active units in Asia and Africa, that represents political utility of the perception of Soviet military power. When the Soviets can overfly Turkish air space to supply arms to their clients in the Middle East and Africa while persuading the Turks not to allow U.S. U–2 flights to assist in SALT verification, that represents the political utility of Soviet military power. The Soviets probably take much of the credit for the U.S. decision to defer deployment of neutron weapons. The current campaign against NATO modernization is another attempt to reap political benefits as the military balance shifts in the Soviet's favor.

Second, the Soviet leaders are committed by their military doctrine and strategy to prepare to fight, win and recover from a nuclear war with the U.S./NATO coalition. This means balanced strategic offensive and defense forces to limit damage to the U.S.S.R. with large ground, air and naval forces to defeat enemy forces and occupy NATO countries. Strategic offensive forces must be able to conduct effective counterforce operations and to regain the initiative in a second strike scenario. Active strategic defense must be able to defend the country and military forces in the field from enemy air, missile and space forces and to conduct effective anti-submarine operations against enemy SLBM's. Passive defenses must be able to protect the population, repair the damage to essential industry, and provide the basis for economic recovery.

Third, Party directives on weapons acquisition policy specify "quantitative and qualitative superiority" over the probable enemy as the objectives of military weapons development and procurement. Lately Mr. Brezhnev has been denying that superiority is the Soviet objective and this theme is being repeated by Soviet military leaders. Such denials, however, are merely part of the strategic deception campaign that began in 1972–73 and has been expanded since 1976.

These ambitious goals are very expensive. The Soviets have made a lot of progress in acquiring a war fighting, damage limiting, war winning and survival military posture. This makes them feel much more secure because they believe such a posture is the best deterrent and a prerequisite for achieving their foreign policy objectives. Nevertheless, many of the required military capabilities have been achieved only in part and others are years, perhaps more than a decade away. The Soviets started the competition from a position of economic and

technological inferiority and the rapid growth of modern technology keeps raising the economic ante.

The rationale for Soviet weapons acquisitions has been clearly stated in their literature for years, and is not difficult to infer from their observed deployments. Bureaucratic inertia and self-serving interests, politics, and action-reaction all play a role but do not dominate Soviet military policy. Viewed deductively, the forces in the field represent a consistent, persistent effort to achieve the objectives specified by doctrine and strategy, subject only to technological, economic, and other constraints. Viewed inductively, the tenets and objectives of doctrine and strategy can be inferred from the thrust of observed R&D programs and deployments.

It should not be difficult, however, to understand why the Soviet leaders have been willing to pay such a high price for defense for more than two decades. They are not likely to stop now. It is a serious question, however, as to what pace they will maintain in the 1980's. Presumably defense outlays will grow somewhat less rapidly in the 1980's than in the 1970's but so many expensive procurement programs either are underway or are likely to be approved at the next Party Congress in early 1981 that the burden of defense on the Soviet economy probably will continue to grow in the 1980's.

COMPARISON WITH THE CIA ESTIMATES

The prior statement on Soviet defense and procurement expenditures presented estimates based entirely on published Soviet economic data. The CIA's estimates, derived from their direct costing or "building block" approach, are quite different in both trend and magnitude. Figures 6 and 7 compare the respective estimates for total defense expenditures and procurement.

Note the two check points shown in Figure 6. These are 50 billion rubles in 1970 and 58 billion rubles in 1972. Both fall at the upper limit of my estimates derived from Soviet economic data. The first check point represents the evidence that caused the CIA to double its estimates. The second check point reportedly came from Brezhnev himself. Already in 1972 it is 10 billion rubles (58 vs 48) higher than the mid-point of the revised CIA estimate. How does the CIA explain this discrepancy?

The prior CIA estimate in Figure 6 intersects my estimate at the year 1960. This does not mean we agree in 1955–60 but only that CIA estimates are not available for the years before 1960. Note that the revised CIA estimate, (a) exceeds my estimate for the years before 1970, (b) has essentially the same rate of growth as the prior CIA estimate, and (c) diverges from my estimate based on Soviet economic data after 1970 the same way the prior CIA estimate diverged after 1960.

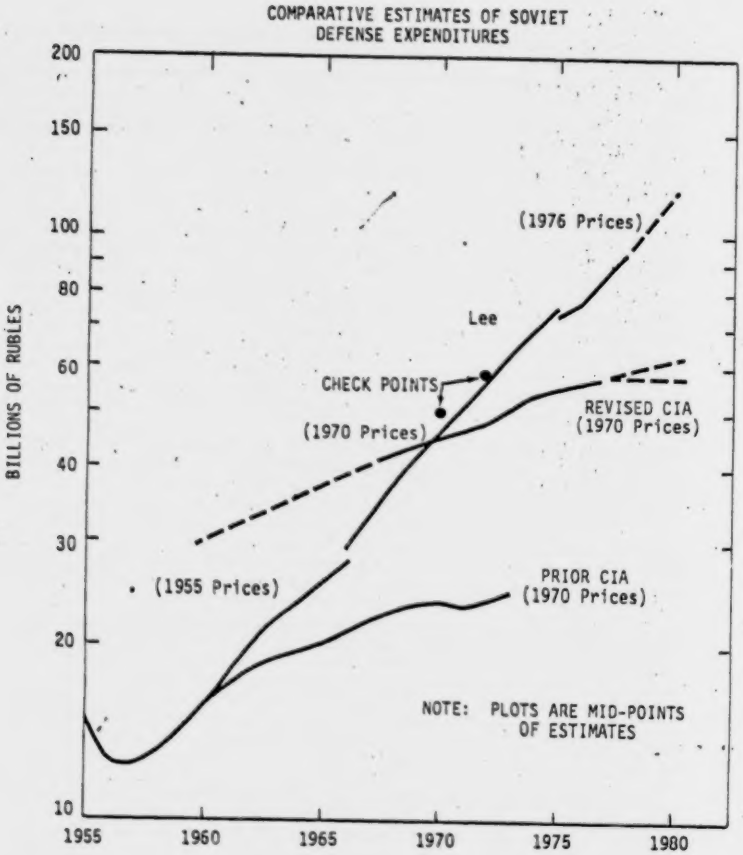
COMPARATIVE ESTIMATES OF SOVIET DEFENSE EXPENDITURES
BILLIONS OF RUBLES
200
150
100
80
60
40
30
20
10
1955
1960
1965
1970
1975
1980
(1976 Prices)
Lee
CHECK POINTS
(1970 Prices)
REVISED CIA
(1970 Prices)
(1955 Prices)
PRIOR CIA
(1970 Prices)
NOTE: PLOTS ARE MID-POINTS OF ESTIMATES

FIGURE 6

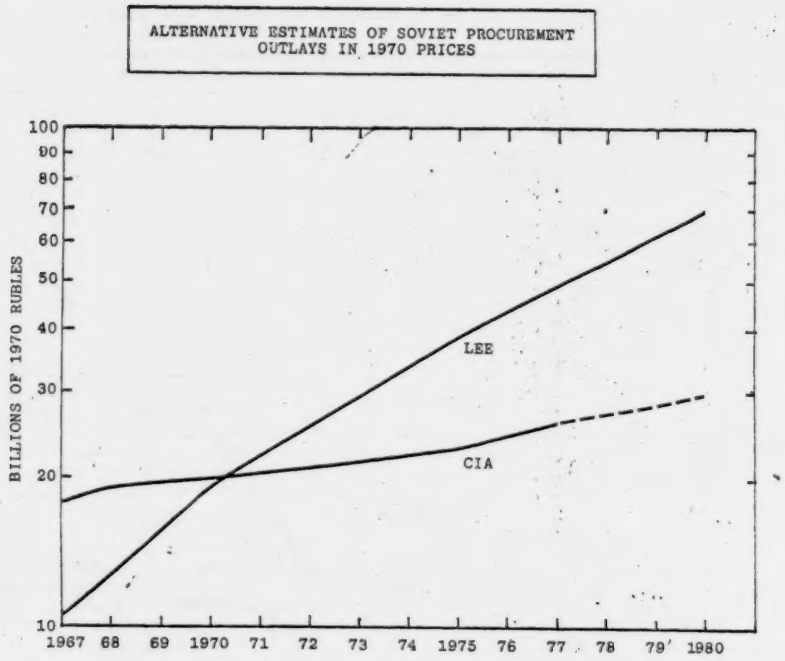

FIGURE 7

In his testimony before Senator Proxmire's Subcommittee on Priorities and Economy in Government in 1978, the Director of CIA, Admiral Stansfield Turner, responded to one of Senator Proxmire's questions with the following statement (among others) ; "Moreover, we can find no set of Soviet activities which fit the spending trends indicated by the announced defense budget." Historically, this is not factually accurate. The RDT&E component of the prior CIA estimate in Figure 6 consisted of about two-thirds of reported Soviet expenditures for "Science." Subtract this component and the prior CIA estimate was, for all practical purposes, the same as the "announced defense budget." Indeed one may inquire as to why the CIA spent so much of the taxpayers' money, my estimate is 0.5 to 1.0 billion dollars since the mid-1950's, to conclude the Soviet expenditures for procurement, pay, maintenance, operations and construction were essentially the same as the "announced defense budget." One may also ask why the CIA believed its estimates when they turned out to be essentially the same as the announced defense budget. After all, it has been clear since about 1956 that procurement had been taken out of the announced defense budget at the beginning of the Korean War (if not earlier).

At several points in his testimony Admiral Turner states that the U.S.S.R., like the U.S., is experiencing "escalating development, production and maintenance costs" as a result of the "increasing complexity of new weapons." Yet the CIA's growth rate for procurement of weapons is less than 3 percent per annum when measured in dollars and about 3.8 percent per annum when measured in rubles. These growth rates cover both growth in weapons inventories and the increasing complexity of each individual weapon. The U.S. reportedly has been experiencing six percent growth in weapons cost from complexity alone. At three to four percent per annum for procuurement outlays, the CIA's growth

rates leave no room for "escalating" costs due to increased complexity. Are they even adequate to account for the increase in the physical number of MIRV's, tanks, guns, aircraft, missiles and naval tonnage? Not likely.

Consider, for example, the CIA's estimate of the growth in procurement and operating ependitures for the Soviet Navy—less than three percent per annum for the period 1967–77. Yet Secretary of Defense Brown tells us that the tonnage of Pact navies—mostly the USSR—grow by more than a million tons, nearly 3 percent per annum, in the same period. Now, Admiral Turner, where is the "escalating" cost of complexity?

We have seen earlier that Soviet data indicate that the physical growth in the Soviet weapons inventory (in terms of tons of metal) grew at about 8 percent per annum in the period 1962–72. At the CIA's growth rates—ranging from less than three to 3.8 percent per annum in dollar and ruble procurement costs—weapons complexity would be decreasing in the Soviet Union, or inventories would be shrinking. Yet all our information on the physical characteristics of Soviet weapons show increasing complexity and higher levels of technology over time. Meanwhile, most of the inventories are increasing in physical terms. (Even those showing fewer numbers such as ships and some aircraft are increasing in tonnage.) Once again, Admiral Turner, where is the "escalating" cost of complexity of Soviet weapons in the CIA's estimates of Soviet procurement outlays?

As has been noted, my estimates derived from Soviet economic data imply that the cost of complexity has been increasing at about 6.5 percent per annum for Soviet weapons procurement, or roughly the same as in the U.S. Inasmuch as the Soviets have been playing "catch up" with the U.S. in weapons technology, 6.5 percent per annum for complexity appears conservative.

Few changes in Soviet military policy and weapons procurement patterns have occurred since the late 1950's. Weapons for the Ground Forces and Frontal Aviation (tactical air forces) have received much higher priority since the fall of Khrushchev. Weapons procurement has been designed to prepare these forces to fight both a conventional and a nuclear war instead of just the latter type of conflict. The ABM Treaty prohibits further deployment of ballistic missile defenses but has done nothing, to put it mildly, to inhibit Soviet procurement of all other types of weapons designed to fight and win a nuclear war, to limit damage so that the USSR may survive and recover. Their recent statements notwithstanding, the Soviet leaders still seek military superiority over the U.S. and its Allies. The probability that the Soviets will abrogate the ABM Treaty in the mid-1980's appears very high if the Soviet leaders continue to follow the military policies of the past two decades.

The only factors likely to change the thrust of Soviet military policy are basic changes in the leadership and extreme economic pressures. Nature will force some changes in the Soviet leadership during the next few years but no political analysts known to this observer are forecasting leadership changes that will lead to basic changes in Soviet policies. The Soviets have a number of serious economic problems—energy, labor, agriculture—but are they serious enough to force basic changes in Soviet economic priorities before 1990? Not very likely.

APPENDIX A

Conventional wisdom contains a number of historical interpretations of Soviet policies during the past three decades that affect present assessments of Soviet motivations and intentions. In my judgment, the conventional wisdom is wide of the mark in several instances.

Khrushchev is often said to have believed in minimum deterrence and cutting military budgets in favor of civilian programs. During the brief period 1955–57 the military budget was cut and defense dropped from about 12 to about 9 percent of Soviet GNP. As we have seen, however, this trend was reversed in 1958 and both defense expenditures and procurement grew extremely rapidly in 1959–1963 when Khrushchev was at the height of his power. Moreover, buying 700 IR/MRBM's to fight a nuclear war in Eurasia was hardly a policy of minimum deterrence. Procurement of all the other weapons—SAM's, interceptors, radars, SLCM's—designed to limit damage to the USSR in the event of nuclear war also does not fit the conventional wisdom. Finally, development and initial deployment of the SS–9 and SS–11 ICBM's, the Y-Class SSBN and ABM defenses of Moscow were approved and funded by Khrushchev.

Soviet humiliation in the Cuban missile crisis is widely credited as the cause of the Soviet missile buildup in the late 1960's. Evidence to support this interpretation is hard to find. Clearly the decisions to develop the SS–9 and SS–11 were taken before Cuba. The early history of the Y-Class SSBN is less clear but where is the evidence that the Soviets did not start development of this boat until after October 1962? Some observers date the development of the SS–N–6 prior to Cuba. In terms of defense expenditures, 1964 and 1965 posted the slowest rates of growth of any year after 1958 and procurement also grew relatively slowly in these years. Not exactly the pattern one would expect if Cuba had been the causal factor in the subsequent buildup.

Leadtime analysis also suggests that development of Soviet MIRVed ICBM's was approved circa 1966 as part of the 8th Five Year Plan (1966–1970). Thus the Soviet decision to develop MIRV's was taken at about the same time or even a bit earlier than comparable U.S. decisions. Hence the Soviet MIRV program is not the example of simple "action-reaction" usually alleged. Moreover, Soviet targeting requirements against both hard and soft targets required MIRVed missiles. Otherwise the cost of satisfying these requirements would have been prohibitive.

SALT has been widely perceived as a means by which the Soviets could reduce their defense expenditures. The evidence goes the other way. Soviet defense expenditures have roughly doubled since SALT began in 1969. Without SALT the Soviets might well have modernized their IR/MRBM force with ICBM's. However, they are now modernizing the force with the mobile SS–20 which is a more expensive way of doing it. Without SALT the Soviets might have deployed a couple hundred more ICBM's of the SS–9/18 class. This is about the only savings that can be ascribed to SALT because further deployment of the Moscow ABM system almost certainly had been rejected on cost and effectiveness grounds long before SALT began. Indeed, Soviet inability to compete with the U.S. in ABM deployment probably was one of the principal reasons the Soviets entered into SALT but that is the subject of another paper.

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The lists of major Soviet weapons procurements are taken from the forthcoming U.S. Strategic Institute study "SALT and Soviet Defense Expenditures." Sources for the procurement data on various weapons systems will be found therein.

Mr. LEE. May I direct your attention then to figure 1 of the prepared statement which depicts the growth of total Soviet defense expenditures and procurement over the period 1955–80. You will note that both defense expenditures and procurement dipped in the mid-1950's from about 1955 to 1958. In my view this was a result of the fundamental reorganization and reorientation of Soviet military programs for the nuclear age, and a degree of demobilization following the mobilization of the Korean war. Then both trends started upward. The periods of most rapid growth in both defense and procurement outlays occurred in 1958–63 under Khrushchev and then in the period 1966–70 under his successors. There was a dip in the rate of growth of both categories of expenditures in the mid-1960's, in 1964–65.

Procurement has consistently grown much more rapidly than defense expenditures and continues to do so. Note the discrepancy in the later years as the procurement rate increased faster than the rate of increase of total expenditures. In the 1970's, procurement has been growing at about 14 to 15 percent per annum. Remember that all of

my data are in rubles. I do not deal, Mr. Chairman, in dollars if I can possibly avoid it because I have very little faith in dollar estimates and because the Soviets do not spend dollars. Dollars really do not tell us much about Soviet priorities and policies.

Senator BYRD. For the record, how do you equate rubles to dollars?

Mr. LEE. Mr. Chairman, if I can avoid it, I do not, because I have very little confidence in the underlying evidence that is needed to make that equation. I would agree, of course, that if one were to buy the Soviet defense establishment in the United States it would cost substantially more than we are spending for defense in dollars—that is, if we were to replicate their weapons systems, their programs, their people in the United States—we would have to spend more than we are spending for defense. Exactly how much more, however, is uncertain because of the problems of translating rubles into dollars. We simply do not have reliable data.

The next graph, figure 2, deals again with procurement. It shows both procurement and total defense expenditures in billions of rubles. You can see the absolute magnitudes there. I estimate the Soviets are spending about 65 billion rubles for procurement this year and it probably will be up 10 billion rubles next year. They are already spending a good deal more for procurement alone than the CIA estimates for total Soviet defense expenditures.

Senator BYRD. You are dealing in rubles. What do you estimate to be the ruble expenditure for, say, 1979 or 1980?

Mr. LEE. For 1980—my projection I think is fairly good because we have actual data through 1978, the plan for 1979 and the 5-year-plan goals. I expect they will be spending over 100 billion rubles. The reasonable range for Soviet defense expenditures in 1980 seems to be 108 to 125 billion rubles.

Senator BYRD. If you look back, say, 5 years to 1975, what do you estimate the ruble expenditure at that time?

Mr. LEE. In 1975, sir, the total was on the order of 70 to 75 billion, and if you go back another 5 years it was 50 billion in 1970.

Senator BYRD. So, you estimate that the Soviet military expenditures have doubled in the decade of the seventies.

Mr. LEE. Yes, sir, that is correct for total military expenditures. Procurement has more than doubled. Procurement has doubled each 5 years since 1970.

The next graph, figure 3 shows the impact of these patterns of defense expenditures and procurement on the structure of the Soviet defense budget. Essentially R.D.T. & E. and Space seem to be fairly constant at about a quarter of total Soviet defense expenditures. Operating costs—that is, pay of people, operation of the military establishment, maintenance and military construction—are a declining share of total expenditures. The reason for this is the rapid growth of procurement.

In 1970 procurement was nearly 40 percent of total defense expenditures; currently it is over 50 percent. Pay, maintenance and operation have grown absolutely but have declined as a share because the increase is determined by the very high ratio that is put into weapon procurement.

Senator BYRD. Let me see if I can understand in a different way.

I figure that out of each U.S. defense dollar, about 60 cents goes for personnel and personnel related costs. Now how do you equate that to what the Russian percentage spent for personnel and personnel related costs?

Mr. LEE. Mr. Chairman, my data indicate that personnel expenditures—that is, everything required to pay the people, to feed them, clothe them and take care of them—is currently around 10, possibly 12 percent of Soviet expenditures. Out of each defense ruble 10 to 12 kopecks goes for personnel expenditure.

Senator BYRD. It is as low as 10 to 12 percent of the total defense expenditure?

Mr. LEE. Yes. It has been declining substantially because the pay of people rises slowly while expenditures increase very rapidly.

Senator BYRD. I don't know if anyone should advocate that the United States adopt the pay scale of the Soviet Union, but I think it would dramatize the severe problem which the United States faces vis-a-vis the Soviet Union in the defense field when such a high percentage of U.S. defense costs goes for personnel and versus such a very low percentage—lower than I thought—for the Soviet Union. I had been using a figure between 22 to 26 percent, but you indicate it is much lower.

Mr. LEE. Yes, sir.

Senator BYRD. Not much more than half of what I had been estimating.

Mr. LEE. Yes, sir.

Senator BYRD. Do you feel that you are accurate in that assessment?

Mr. LEE. Yes, sir, I do. My data so show and I feel fairly confident that that is the approximate percentage. That does not include pensions because we do not have good data on Soviet pensions but they would not change it very much.

Senator BYRD. I don't think that would have any great effect on the percentage. My feeling is that the Russians don't have much in the way of pensions.

Mr. LEE. Not too much.

Senator WARNER. Would the chairman yield?

Senator BYRD. Yes.

Senator WARNER. I think our figure is going to increase. I happen to be one who advocates an increase in pay for the U.S. military. They basically have been frozen since 1972, and I feel one of the major contributing causes to our inability to meet the all volunteer requirement is pay. So the figure you use, I have been using around 57 percent, give or take a point or two, 60, and could even go higher than the Soviets if the raise goes through.

Senator BYRD. Thank you.

Senator Jepsen, do you have questions?

Senator JEPSEN. No.

Senator BYRD. Please don't hesitate to interrupt at any point, because Mr. Lee and I are just having a discussion back and forth, really.

Senator Jepsen, do you have something?

Senator JEPSEN. I don't have anything at this time, Mr. Chairman. Thank you.

Senator BYRD. Mr. Lee, please proceed.

Mr. LEE. One further comment. Soviet conscripts are paid less than the price of a bottle of vodka a month. That is one way to keep personnel costs down. Soviet officers are quite well paid but still the rates of increase each year are slow.

Senator BYRD. Before we leave that point, what is the research and development percentage of the total Russian defense outlays?

Mr. LEE. About a quarter as far as I can determine and fairly consistently so.

The next graph in the statement figure 4, shows the impact of defense expenditures on Soviet gross national product as near as we can compute it from the public Soviet data which are rather complete and, I believe, fairly reliable. Defense has been steadily increasing as a share throughout the period but the share has been growing more rapidly in the 1970's than previously.

In 1960 defense was less than 10 percent of Soviet GNP. It was up to 12 percent by 1970, to nearly 15 percent in 1975 and is headed for 18 percent in 1980. The reason the share increases more rapidly in the 1970's has been that the growth of economy has declined considerably while defense has maintained a high rate of growth. This particular chart was drawn up to reflect the pattern of allocations built into the 10th 5-year plan—1976 to 1980.

Senator JEPSEN. Excuse me. Which chart are you on?

Mr. LEE. That is figure 4.

Senator JEPSEN. We don't have it.

Mr. LEE. I have extra copies.

Senator WARNER. It is being duplicated so it is just a matter of a short time until it will arrive. Is that right, Mr. Chairman?

Senator BYRD. Yes.

Do you have a question Senator Jepsen?

Senator JEPSEN. We are all set now.

Mr. LEE. This chart, as I say, shows a projection of Soviet resource allocations built into the current 5-year plan which runs from 1976 to 1980. In this plan the Soviets did a rather unusual thing, they decided to cut investments share of GNP from about 32 percent to about 28 percent and to hold consumption constant at about 54 percent. They did this in order to accommodate the increase in defense from 15 percent to about 18 percent.

During the first 3 years of the plan they followed pretty much what they had originally intended to do but they have now started to shift the allocation of resources somewhat to reduce the cut in investment at the expense of consumption. Investment probably will end up about 30 percent of GNP instead of dropping to 28 percent, or about 2 percentage points higher than originally planned.

Senator BYRD. Has it consistently been running at about 30 percent of GNP?

Mr. LEE. Pardon me, Mr. Chairman.

Senator BYRD. Has the military expenditure been running consistently at around 30 percent?

Mr. LEE. No, sir. Military expenditures have increased from, say, around 12 percent in 1970 to about 15 percent in 1975 and about 18 percent in 1980.

Senator BYRD. What is the 30-percent figure you used a moment ago?

Mr. LEE. The 30 percent referred to investment. Investment historically has been 30 percent of GNP. The 5-year plan called for in a reduction in investment from about 32 percent in 1975 to about 28 percent in 1980. I believe this reduction will not quite take place as planned, it will only drop from 32 to about 30 percent of Soviet GNP.

Senator BYRD. As I understand it, the data you have given thus far indicates that R. & D. and Space take about 25 percent.

Mr. LEE. Of the defense budget, sir.

Senator BYRD. Of the defense budget.

Mr. LEE. Yes.

Seantor BYRD. Personnel pay takes 12 to 14 percent of the defense budget and procurement takes 60 percent. Where and what are the amounts for military construction and operation and maintenance of the forces?

Mr. LEE. They are in the difference, sir. On the previous chart maintenance and construction would be no more than about 12 percent, a little less. About 20 to 25 percent for R. & D. and over 50 percent for procurement. That means just under 25 percent for pay, maintenance, operations and military construction. About half of that is personnel cost.

Senator BYRD. That is 50 percent for procurement.

Mr. LEE. That is right, yes, sir. A bit more.

Senator BYRD. Thank you.

Mr. LEE. The share has been increasing. I will return to GNP. Spending 15 to 18 percent of GNP on defense places a very heavy burden on the Soviet economy and in my judgment is one of the reasons why the Soviet economic growth rate has declined.

Another way of looking at the impact of the defense burden is to consider the allocation of machinery output in the U.S.S.R. between military and civilian uses. Civilian uses are essentially two, producer durables that go into new capital investment and consumer durables, washing machines, TV's, cameras, watches, and things like that sold to individual consumers.

If you will look at figure 5, you will see that procurement has been rising very steadily as a share of total machinery production. In 1965, it was around 30 percent and currently it is over 50 percent of total Soviet machinery output. This, of course, impacts very heavily on Soviet ability to invest in new plant and particularly in new technology. They have compensated for this to a considerable degree in the 1970's by increasing their imports of machinery and equipment from the West. What they are doing essentially is shifting more and more of their own resources to production of military hardware and equipment and offsetting this to a large degree by importing machinery, much of which is financed by Western loans and credits.

Senator BYRD. May I say again to my colleagues, please interrupt if you wish to raise a point.

Senator WARNER. Thank you, Mr. Chairman.

Senator BYRD. In your judgment, how accurate have the Central Intelligence Agency figures been in the past in estimating the Soviet military expenditures?

Mr. LEE. Mr. Chairman, they have been remarkably inaccurate and continue to be so as far as I can tell. As you are aware, and the evidence is available in the public domain, we have two check points on

Soviet expenditures independent of my estimate and independent of the CIA estimate. One of these check points is 50 billion for 1970; the other is 58 billion for 1972. The latter reportedly came from Mr. Brezhnev himself when he said the Soviets were spending one-third of their budget on defense. That amounts to 58 billion rubles in 1972. Both of those figures fell at the high side of my estimate.

The 50 billion rubles figure for 1970 caused the CIA to double their estimates. They previously had estimated 1970 expenditures in 1970 prices, at 24 billion rubles and they went up to 45 billion rubles when they found out the figure really was 50 billion.

Senator BYRD. Then are you saying that in your judgment the CIA was off by 100 percent?

Mr. LEE. They admitted it themselves for 1970, Mr. Chairman. They are also, according to my research, about to be off by 100 percent once again.

Senator BYRD. On the estimate for 1980?

Mr. LEE. Yes, sir.

Senator BYRD. I understand that the CIA feels that your estimate is not much different from its estimate, if you take into account inflation in Russia. Do you share that view?

Mr. LEE. No, sir, I don't. The term inflation has to be used very carefully. As you are no doubt painfully aware, and we are all painfully aware, the rate of price inflation has been very high in the United States in recent years. The Soviets have not suffered from comparable price inflation. There is, however, another kind of increase in cost, particularly in procurement, of defense expenditures in both economies.

Both the United States and the U.S.S.R. are making their weapons systems more complex and incorporating advanced technology. This increases the unit cost of the weapons systems from one generation to another. The Soviets experience this the same as we do. When they go from single RV missiles to MIRV'ed missiles the cost goes up. When they increase the accuracy of the missiles, the cost goes up.

In the United States there have been some studies which indicate that the cost of increasing complexity and technological innovation in U.S. weapons systems amounts to about 6 percent per annum. My data indicate that the Soviets are experiencing a very similar increase in cost due to these factors, about 6.5 percent per annum. The CIA measures, to the best of my ability to decipher them, do not incorporate the increase in complexity and technology of Soviet weapons systems. That factor, not price inflation, does account approximately for the difference in the rate of growth of the two estimates.

Senator BYRD. In your prepared testimony you state that 50 percent of the Russian machinery output in 1980 will be devoted to production of military durables. What is the basis for that estimate?

Mr. LEE. The basis for that estimate, sir, is the same method I have been using all along and my estimates were confirmed by the two check points referenced earlier—50 billion rubles for 1970 and 58 billion for 1972. The Soviets provide information on how much of their machinery output goes to civilian uses. Conceptually the process is rather simple although the data require a great deal of research. You simply move from gross output as reported to final demand. That is, you take out intermediate products and then you subtract out the

civilian uses—investment and consumer durables. The remainder, net of imports and exports, is military procurement.

Senator BYRD. And you estimate that of all the machinery production, 50 percent will be for military purposes?

Mr. LEE. Somewhat more in 1980, yes, sir.

Senator BYRD. Do you have an estimate as to what the comparable U.S. figure would be?

Mr. LEE. No, sir, I do not. I believe that the CIA has indicated that it is something on the order of 10 to 20 percent in one of their studies.

Senator BYRD. That is the U.S. figure?

Mr. LEE. Yes, sir. You might ask them about that. I do not have the time and resources to look at the U.S. side.

Senator BYRD. Now in your prepared testimony you also state, "Seldom, if ever, have the nations against which a massive military buildup is directed done so much to finance it." What do you mean by that? Are you speaking of the transfer of Western technology to the Soviet Union?

Mr. LEE. That is part of it, sir, but it is a bit more than that. The Soviets have been making quite a bit of money on domestic account from the profits of foreign trade. If you put together the Soviet GNP accounts from their data, you find that up through 1970 sufficient GNP was earned in the economy to accommodate expenditures on consumption, investment and defense.

As we move into the 1970's there is a gap between what is domestically earned and what has been spent. It turns out that this gap is largely, if not entirely, covered by the internal profit of foreign trade. Essentially, the Soviets could not have balanced their books in the 1970's with the pattern of allocation that they have pursued had it not been for those profits from foreign trade. Now some of that comes from the profits from U.S. grain that is purchased at relatively low prices, at least in terms of what it would cost them to produce it, and part of it, of course, is what they realize from other types of imports, much of which has been financed by credits and loans.

As I mentioned earlier, the Soviets have compensated to a considerable degree for the diversion of resources from civilian types of machinery output to military procurement by importing increasing quantities of machinery from the West. It appears that in 1980 imports will supply at least 30 percent and perhaps as much as 45 percent of total machinery allocations to capital investment. This is up from about 10 percent a decade ago. I could give you more precise figures on that.

Senator BYRD. In the last few years have the Soviets been spending about as high a percentage of its gross national product for military purposes as could reasonably be expected?

Mr. LEE. Mr. Chairman, I wish I could give you a precise answer to that question. The Soviets have continued to amaze me at how much they have put into the military. I thought it would have leveled off before this. I don't know how much higher it can go.

In order to answer that question properly we need a fairly good measure of the opportunity cost of defense: that is to say, how much economic growth, how much investment and how much consumption, is given up when they spend "x" number of rubles on defense, or

when they increase the defense share of the total GNP. We do not have an economic model that gives us that kind of answer with any confidence so anything I say to you has to be only a judgment on my part.

A great deal of money has been spent on developing economic models that should answer that question, a good deal of it by the Central Intelligence Agency, but those models don't work and they don't give us reasonable answers. My judgment is that the Soviets probably can increase the defense burden somewhat in the 1980's and still maintain a rate of economic growth that is tolerable at least for another 10 years. I would anticipate that rate of growth might be on the order of 3 percent and the share of GNP devoted to military might go up 20 percent. I have a hard time believing it will go much higher.

Senator BYRD. It will go up to 20 percent?

Mr. LEE. Yes.

Senator BYRD. What is it now?

Mr. LEE. Approaching 18.

Senator BYRD. So it is already at pretty close to its peak?

Mr. LEE. Well, sir, as I said, I thought that it had peaked earlier and the Soviets have continued to increase it so really we will have to wait for the next 5-year plan which will be available in early 1981 to answer the question.

Senator BYRD. In your judgment, is the rate of Soviet defense expenditures best explained by modernization or by expansion of forces?

Mr. LEE. It is explained by both, sir.

Senator BYRD. Both modernization and expansion?

Mr. LEE. Yes, sir. You can see that in some cases they are buying more weapons while in some cases they are modernizing. They are buying more warheads, for example, but not more ICBM's. They are buying about the same number of nuclear-power submarines each year but something like the *Alpha* class submarine, which is very high performance in many respects, obviously costs an immense amount of money. So it is a combination of the two, of modernization and expansion.

We have seen an increase in inventories in some cases while in other cases the inventories are fairly stable. There have been significant improvements in the hardware in those inventories. For example, the air defense forces have had a relatively stable interceptor inventory but now the Soviets are about to buy some very expensive models according to the CIA. I refer to the CIA projection that the Soviets will buy advanced interceptors having a look down/shoot down capability, the SA–10 SAM and other air defense hardware. That is a case of modernization. Inventories may not change very much but it is very expensive modernization.

Senator BYRD. I note that Franklin D. Holtzman, professor of economics at Tufts University and an associate at the Harvard Research Center, makes the following statement: "All things considered, the CIA's categorical conclusion that the Soviet Union is outspending the United States on defense may well be a figment of its faulty methodology."

Do you have a comment on Mr. Holtzman's statement?

Mr. LEE. I believe, sir, that the statement refers to the CIA dollar estimates. I do not believe these overstate the cost that the United States would incur if the United States bought the Soviet defense

establishment. I believe, if anything, the CIA dollar estimates are on the low side. However, as I said earlier, I have very little faith in any dollar estimate because of serious data uncertainties, but I do not believe Mr. Holtzman's statement is correct. This is one case in which the CIA and I more or less agree.

Senator BYRD. Senator Warner?

Senator WARNER. Thank you, Mr. Chairman.

Let's try and draw a parallel between the data base the CIA uses and the data base that you use.

Mr. LEE. Yes, sir. The CIA uses the so-called direct costing or building block method.

Senator WARNER. That may be methodology. I am talking about just the basic facts from which you begin to work in.

Mr. LEE. Yes, sir; I will come to that. That means that the CIA starts with the things that it can see with the national means of verification, the things that it can count—so many missile launchers, so many tanks, so many ships, so many people, so much new construction in physical terms. That is the data base the CIA work with.

Let me expand on that a little. They have to then cost these things first in dollars and then convert them into rubles by ruble/dollar ratio except for manpower and a few other items. I work entirely with Soviet published economic statistics and the Soviet Union's own description of their economic performance. So I work with things like Soviet machinery output and allocation data. I work with the Soviet budget—what can be derived from it—and so on.

Senator WARNER. We don't attach 100 percent credibility to anything the Soviets publish. To put it in its simplest terms, I think I would rely more on what our national means collect by way of raw data than what is in Pravda and Izvestia.

Mr. LEE. Sir, let me suggest to you——

Senator WARNER. Let me say I am not endeavoring to discredit your position at all, I am probing because you have a rather dramatic set of conclusions. The CIA is a favored target today and fair game but I want to get down to just how you got where you are and how they got where they are.

Mr. LEE. Yes, sir. Well, I think one of the great myths abroad in the land is that published Soviet data are not reliable. Let me put it another way, somewhat facetiously, but I am very serious. I have been talking about forming a consortium to develop the KH–84 system which would photograph unclassified Soviet literature from space before it is published. If we can do that at great expense to the taxpayer, stamp all sorts of highly classified core words on it, then Soviet literature would have some credibility.

I think one of the most underestimated, unappreciated sources of valid information on the Soviet Union is unclassified Soviet literature. This does not mean that they publish everything nor does mean that we can believe everything in Pravda. If you read Pravda, it is not too difficult in my judgment to know when the Soviets are propagandizing and when they are telling the truth, and by and large they tell the truth about their economic performance to their own people.

Senator WARNER. Repeat that last sentence, please. By and large they what?

Mr. LEE. The Soviets tell the truth about their own economic performance to themselves and to their own people. They are not engaged in keeping two sets of books, one of which is totally deceptive and one of which is the real set of books. There is a classified set of books and an unclassified set of books but the data are essentially the same.

We have one piece of historical verification of that fact, which I believe to be a fact anyway. When the Germans invaded the Soviet Union in 1941 they captured classified [secret] Soviet documents on their economic plans and statistics. This was subsequently compared to published Soviet economic statistics by Western scholars and it was found that everything that was published was the same in the classified documents. There was additional economic data, of course, in the secret documents.

The other way to look at it, sir, is let me direct your attention to figure 6, which compares my estimates and the CIA's estimates over time, both arrived at by these two different methodologies. You will see there the two check points that I referred to as 50 billion rubles for 1975 and 58 billion rubles for 1972. At that time the CIA was estimating 24 billion rubles for Soviet defense expenditures in 1970. That was the result of their direct costing methodology. They had to double their estimate.

I think the fact that they did that at least once is some indication, to me at least, that the CIA methodology is not very reliable. The same open, published Soviet economic data that led me to conclude, prior to the acquisition of the checkpoint, that Soviet defense expenditures in 1970 were 43 to 49 billion rubles now tell me that the Soviets probably are going to spend well over 100 billion on defense next year.

Senator WARNER. How would you draw a parallel between your conclusions with respect to economics? But then at the other end if you translate these into number of airplanes and tanks and foot soldiers and sailors and the like, what is the disparity there?

Mr. LEE. There is not much disparity there that we can pin down.

Senator WARNER. In other words, you and the CIA are basically in agreement as to the number of airplanes, tanks, foot soldiers, sailors, and the like?

Mr. LEE. The answer to that question, sir, is yes and no. Certainly we are in agreement about the number of missile launchers and the number of troops. The number of tanks is something that I do not think the CIA can count with any confidence with the national means of verification. If the Soviets produce more than one missile per operational launcher, I do not believe that in most cases the CIA can detect such production refire missiles if it occurs.

We know that there is at least one missile there for each launcher. There probably are some spares. We know how many missiles they fire for test purposes and so forth. Beyond that the information is relatively inadequate. My data would pick up such production as it occurs. There are other areas where the national means of verification do not provide very reliable data.

You cannot, for example, tell from these means how much ammunition the Soviets produce each year—nor how many bayonets, how many helmets, and all that sort of thing. You can really only see the big items and then you cannot tell how many spares and refire missiles

there are. So to the extent that the Soviets do engage in such production, and I think they do to some extent, to that extent the physical quantity data are different. I have no idea how much undetected weapons production is included in the Soviet data I work with but is missing from the CIA estimates.

Senator WARNER. Would you just say by way of summary then while they inform their people with respect to the totals of dollars expended for military purposes and how that is translated into hardware suddenly goes behind the iron door.

Mr. LEE. That is essentially correct. The Soviets do not inform the general public, of course, how much they spend on defense but the officials who are cleared and have the need to know are accurately informed. Only a very small sphere of Soviet officialdom knows how much is spent for defense because the books are held very tightly.

Senator WARNER. Thank you, Mr. Chairman.

Senator BYRD. Thank you, Senator Warner.

In your prepared statement, you referred to a postulated Soviet policy objective of achieving political goals through military power. In this connection, you mention Soviet military operations in the air space of our NATO ally, Turkey. Could you elaborate on that and give the committee further information.

Mr. LEE. Mr. Chairman, I am just referring to the published reports that when the Soviets needed to fly over Turkish air space to resupply their Mid East clients with weapons they simply overflew Turkish air space. I assume they got permission but they had no problem getting permission, presumably. When we wanted to use Turkish air space to verify the SALT II Treaty provisions, the Soviets put pressure on the Turks to deny it and they did so. I think that is one example of the political utility of the Soviet military establishment in a peacetime situation.

Senator BYRD. What you are saying is that the Soviet Union used Turkish air space to take troops to South Yemen?

Mr. LEE. I believe it was supplies rather than troops. I don't know anything about troops.

Senator BYRD. To South Yemen?

Mr. LEE. One of the places, yes. It goes back to this idea in the West, which became very prevalent in the sixties, that any margin of military superiority had no political utility. The Soviets have never accepted that or believed it and I think they would say that their ability to do some of these things is in considerable part due to the growth of their military power and the public perception.

Senator BYRD. Just one final question. I recall in testimony to Senator Proxmire's subcommittee in 1978, the CIA responded to your criticism. Do you want to comment on that response?

Mr. LEE. Yes, sir, I would be very pleased to comment on that response. I happen to have the document with me. Let me turn to page 67 of the hearings, "Allocation of Resources in the Soviet Union and China—1978." The CIA response to the criticism that they cannot count every weapon the Soviets produce is that identification of Soviet defense activities and programs is among the highest priorities of the intelligence community.

That no doubt is correct. Identification of how many launchers they have is a high priority item. The CIA and the intelligence com-

munity do an excellent job of determining how many launchers there are. But it goes back to the problem mentioned earlier, how many missiles do the Soviets have? To say we give high priority to identifying the existence of Soviet launchers does not answer the criticism that indeed we cannot count every missile they produce.

The next criticism is that information on the characteristics of Soviet weapons systems required to cost them accurately in dollars often is insufficient. The CIA response to that criticism was: "A knowledge of Soviet weapons characteristics is another high priority of the intelligence community. We are confident that the community's estimates in this area are sufficiently accurate to support our costing work."

Well, the first part of that statement merely says that it is high priority objective of the intelligence community to find out what the characteristics of Soviet weapon systems are. That is indeed true. The United States spends a great deal of money, I suppose billions of dollars a year, trying to do that. However, in many cases there are large gaps in our information about the characteristics of Soviet weapons. If the CIA were able to determine Soviet weapons characteristics precisely, its expenditure estimates would be much closer to mine.

The third criticism is that CIA's "ruble" estimates are based on insufficient knowledge of Soviet prices and costs. The CIA's response to that criticism is "We also believe that our knowledge of Soviet military prices and costs is sufficient to support our ruble estimates." Well, they said that years ago when they were estimating Soviet defense expenditures at 24 billion rubles for 1970. The CIA doubled those estimates and now it says the same thing about confidence in its ruble prices.

I am sorry, but I do not think that is an adequate response to the criticism. I think it stands.

Finally, the CIA notes the criticism that the agency fails to check its estimate against published Soviet statistics. The CIA response to that: "We do make use of Soviet economic and financial data to check our estimates. . . . We do, however, welcome the efforts from all who are working to advance our understanding of Soviet economic financial statistics."

With the 25 years experience I have had in trying to work with the CIA on Soviet defense expenditures, it is very difficult to comment on that particular response in polite language. However, I will do so.

Over the years while with the CIA and after I left the CIA, I repeatedly brought to their attention methods and data that would serve as checks and would improve CIA estimates in other ways. Invariably, the official CIA response was: The data are not what you say they are; the data are not reliable; you misinterpret the data. That is when the CIA was being polite. Sometimes the CIA was not polite. Rather, they were nasty and insulting. That statement about how they always welcome new information and new methods based on Soviet data is not factually accurate.

Senator BYRD. Thank you, Mr. Lee.

I may have a few additional questions, but since we are running short of time, I will just ask that you respond for the record.

Senator WARNER. Mr. Chairman, following along with that observation, are there other individuals or organizations either in the United States or worldwide that reach conclusions comparable to yours?

Mr. LEE. Well, sir, I am afraid the answer is essentially no. The academic community has taken very little interest in this question, to the best of my knowledge. Most of them have accepted the published Soviet budget line item for defense for many years, and indeed before 1950 that probably was valid. However, the reliability of that figure changed dramatically in 1950 when the Soviets evidently took procurement out of the budget line item for defense.

There has also been a tendency in the academic community to accept whatever the CIA says. Why that is so I do not know, but I believe it is a fair description of the facts. There are, however, some in the academic community who believe that my answers are approximately correct and that the CIA's are not. Not very many but there are a few.

Senator WARNER. Well, the academic community is just one segment. What about all the reputable—we call them think-tank organizations.

Mr. LEE. That goes back to another problem, sir, contained in a statement you made earlier that Soviet data are unreliable. The prevalent attitude has been that either the Soviet data are no good or that one cannot decipher them and therefore one doesn't even both to try.

Senator WARNER. I guess you might consider yourself a loner then, would that be correct?

Mr. LEE. Well, it has turned out that way, sir, but not by design.

Senator WARNER. Before we leave, one figure—I sent for some figures from our staff. Our figures show that, as the chairman said, 59 percent of defense costs were manpower in fiscal year 1978, of which 9 percent were for earnings, so that would leave 50 percent for other manpower costs. You use a figure of 10 to 12 percent for the Soviets. For ease of mathematics, do you think you could take 2 percent out of that for purposes of pension and leave it at 10?

Mr. LEE. No; I think it would add 2 percent.

Senator WARNER. You would add 2?

Mr. LEE. Yes, sir, because that figure does——

Senator WARNER. That leads us to somewhere around 4 plus.

Mr. LEE. Fifteen percent in round numbers to take care of the uncertainty.

Senator WARNER. That is about 3.5 to 4 times. We spend 3.5 to 4 times what the Soviets do on total manpower costs.

Mr. LEE. Well, our percentage.

Senator WARNER. Percentage of the total military.

Mr. LEE. Yes; I do not know what the figure is in dollars. If you value them both in dollars, I don't know.

Senator WARNER. What I want to do is translate that over a base of total manpower because our base—have you got the total manpower figures in the United States and the Soviet Union?

Mr. LEE. I believe ours is about 2.2 million.

Senator WARNER. That is correct.

Mr. LEE. Their estimates run about—I should know that. I believe it is somewhat over 4 million, and how much over 4 million depends on whether you count construction troops, border guards, and all that. I believe the grand total is nearly 5 million men and women in uniform in the Soviet Union.

Senator WARNER. So, again that small percentage is spread over almost twice as many individuals.

Mr. LEE. Yes, sir, that is correct. As I said, that is in large part due to the extremely low rates of pay for Soviet conscripts.

Senator WARNER. Thank you, Mr. Chairman.

Senator BYRD. Thank you, Senator Warner. Thank you, Mr. Lee.

Our next witnesses are Mr. Donald Burton, Chief of the Military Economics Division, and Mr. Ray Huffstutler, Director, Strategic Research, Central Intelligence Agency. Other witnesses will accompany them.

The Chair will recognize Mr. Huffstutler first, whom I understand has a brief observation.

Welcome, all of you gentlemen.

Senator WARNER. Mr. Chairman, let the record show that the CIA witnesses greeted their colleague with a warm handshake as they approached the bench.

Senator BYRD. Let the record so show.

STATEMENT OF RAY HUFFSTUTLER, DIRECTOR, STRATEGIC RESEARCH, CENTRAL INTELLIGENCE AGENCY

Mr. HUFFSTUTLER. Mr. Chairman, ladies and gentlemen, we are delighted to be here today to discuss the subject of Soviet military power, its growth, and to the degree that we can shed some light on it, the expenditures associated with it. As you know, and I find myself here underlining several things that Mr. Lee has already told you, one of the fundamental tasks of the intelligence community is to follow the evolution and growth of the Soviet military establishment and its forces in as much detail as we possibly can. In the past decade we have identified some significant components of growth, which I believe this committee has heard, but by way of example I will simply offer to you to refresh your memories.

We have noted in the last decade, and even before that, an enormous expansion and modernization of the Soviet ground forces in virtually all of its dimensions. We have noted a major buildup and reequipping of the tactical air forces of the Soviet Union that support ground force operations. We have noted an increase in the capabilities and operating levels of Soviet naval forces and the modernization of Soviet naval units.

We have noted the expansion and modernization of the strategic missile forces. The emphasis of the last decade has been in particular on improving the target coverage capabilities of these forces and their destructive potential. As you know, Mr. Chairman, they have not only introduced a whole new generation of strategic missiles into the force but they have improved them in accuracy and in the use of multiple independently targeted reentry vehicles.

We try to describe the aggregates represented by these force increases and these force modernizations in a number of ways. We keep, throughout the intelligence community, detailed order of battle data which show the number of units, the number of divisions, the number of ships at sea. Occasionally, and of course this is the focus of today's discussion, people are interested in aggregate comparisons. That re-

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quires a measure or an index of some sort which we can adduce to show how expenditures or resource commitments to military forces both in the Soviet Union and in the United States compare to each other.

This is difficult in the Soviet Union where the statistics and the information associated with military forces and their development are strictly classified. In fact, as Mr. Lee has just told you, the only defense expenditure line of the Soviet budget is one which nobody has believed for some considerable period of time and which has been relatively unchanged during the period in which we can observe enormous buildup and modernization efforts.

Because of this Soviet secrecy we try to estimate the economic dimensions of Soviet military power in two ways. We try to make estimates in dollars so that people who have to look at the comparative American forces can get some sort of feeling for the relative effort being expended by the two sides. We also try to make an estimate in rubles, and the purpose of the ruble estimate is fundamentally to show something of the burden that the Soviet Union is bearing in creating and maintaining these enormous military forces.

I want to return to a point. Both of these estimates are bolstered to a substantial degree by our knowledge of the physical dimensions of the Soviet forces and in that sense what we are looking at in the economic dimension is analytical construction and I think from the testimony you have already heard this morning you will find that people looking at the same data do indeed differ.

We will try to address these matters in broad terms. I simply want to note here that as we get into some of the details of the particular force modernization or force expansions which might be driving these estimates we may border on information which is best discussed in closed session. We will try to address some of the sources and methods generally, and if we get into detail that is best done in closed session, we will do that. We would be happy to submit to you either a written analysis where it is not possible to discuss it openly, or to go into closed session at your pleasure.

I would like to turn now, if I may, to Don Burton who is the Chief of our Military Economics Analysis Center and who heads up our effort in trying to estimate and calculate the Soviet military expenditures.

Senator WARNER. Mr. Chairman, do we have questions of this gentleman?

Senator BYRD. Certainly.

Senator WARNER. You made the statement that basically we are looking at the same data. I would presume that Mr. Lee does not have access to the collection results of the national technical means.

Mr. HUFFSTUTLER. Mr. Lee has excellent access in this town and, as far as I know, holds or at least from time to time or has held clearances as a defense consultant. I think that one of the things that you will recognize in the remarks is that we hold a very close view of the physical evolution of the Soviet forces. I cannot speak to the status of his clearance at the moment but I know I have talked to him on a classified basis in the recent past.

Senator WARNER. Mr. Chairman, I am much taken back by that response.

Are you suggesting to me that former CIA employees have access to all the data in the agency?

Mr. HUFFSTUTLER. No, sir.

Senator WARNER. Somehow I got that impression.

Mr. HUFFSTUTLER. No sir, I am not referring to that. When a person leaves the agency he loses his clearances. At such time as he becomes a defense consultant to somebody else he may very well have certain clearances reinstated by his new employer on the basis of those needs. If a contracting agency feels he must have access to intelligence data and requests on his behalf access to classified intelligence data, we will talk to that consultant or contractor.

Senator WARNER. In some cases you share 100 percent of the data that you collect with outsiders; would that be correct?

Mr. HUFFSTUTLER. One hundred percent? We would certainly share fully if, in the view of the sponsor, that information was required and if the clearance granted to the contractor or consultant warranted that kind of sharing. We would share the analytical output. We would not share, in many cases, sources or methods.

Senator WARNER. What comment do you have with respect to Mr. Lee's statement that by and large the Soviets tell the truth about their own economic performance to their own people?

Mr. HUFFSTUTLER. Well, I will turn to Mr. Burton for that issue because I think we don't agree.

STATEMENT OF DONALD BURTON, CHIEF, MILITARY ECONOMICS DIVISION, CENTRAL INTELLIGENCE AGENCY

Mr. BURTON. We would take exception.

Senator WARNER. You would take exception.

Mr. BURTON. Certainly the Soviets publish a large amount of economic statistics. These statistics, however, are not large by our definition. There are many, many gaps in these data. Indeed, the amount of data that they publish changes over time and in recent years the published Soviet data are drying up. The Soviet leaders do not share all of their economic information with the general public in the Soviet Union.

Senator WARNER. Well, thank you, Mr. Chairman.

I think one of our responsibilities is to try and define the means by which we have two sets of experts, so to speak—or one individual and one agency—disagreeing, and just how those disagreements were arrived at. I judge there is a considerable difference between the data base used by you and Mr. Lee.

Mr. BURTON. I think there is.

Senator WARNER. Or at least the reliability which you attach to it. I got the impression that he relied on published reports by the Soviet Union as his principal source, and if that be the case you are now saying that you cannot rely on that information, it is not only misleading but it is not fully disclosing of the facts.

Mr. BURTON. That is correct. We examine the same published information. We look at all of the things that Bill looks at which come to the published realm, but come to different conclusions.

Mr. WARNER. You attach a different ratio of credibility to it then than Mr. Lee?

Mr. BURTON. Yes. Well, Mr. Chairman, it is a pleasure for us to be here today——

Senator BYRD. Just a moment. Have you finished, Senator Warner?

Senator WARNER. Yes.

Senator BYRD. Before, I neglected to welcome Mr. Bob Andrews.

Mr. ANDREWS. Thank you.

Senator BYRD. Before you start, Mr. Burton, may I ask Mr. Huffstutler a question.

You are Director of Strategic Research?

Mr. HUFFSTUTLER. Yes, sir.

Senator BYRD. In your opening comments you mentioned the expansion of Soviet forces in various areas. Would it be accurate to say that during the 1970's, the Soviet Union has engaged in a massive military buildup?

Mr. HUFFSTUTLER. The Soviet Union has engaged in a massive military modernization which has also included some buildup of the forces. There are particular areas where the forces have been built up but much of the effort has been in the introduction of new and sophisticated hardware. In some areas the forces have increased and in some areas the forces have decreased but there is no doubt about the kind of investments that the Soviet Union is making.

Senator BYRD. Thank you.

Mr. Burton, you may proceed.

Mr. BURTON. We welcome this opportunity to share the results of our work. I have with me some colleagues to help answer my questions that you may have. Mr. Bob Abbott——

Senator BYRD. Please join the others at the witness table.

Mr. BURTON [continuing]. James Barry and Derk Swain.

The subject of today's discussion—Soviet defense procurement—is treated throughout the intelligence community as one of our highest priority intelligence objectives. We use all available sources and methods to develop the best estimates that we can of the level and trend of Soviet defense procurements. This is because the weapons being procured today will form the core of Soviet military capabilities throughout the decade of the 1980's and on into the 1990's. Also, procurement expenditure patterns provide insights into the prorities that the Soviets place on individual forces and systems.

We will try to be as forthcoming as we can in this context. I am sure you appreciate the fact that this analysis involves sensitive intelligence sources and methods. We will be happy to address in writing any questions that cannot be addressed here for security reasons or discuss them further in closed session.

Senator BYRD. I would mention at this point, that before you arrived, I reminded the witnesses that this is an open session and they should govern themselves accordingly.

Mr. BURTON. Thank you. I wish I could present you with an official set of Soviet plans, or at least a set of their own statistics on past spending for procurement. Unfortunately, as has already been pointed out, the Soviets carefully guard all information on their defense programs as state secrets. It has also been pointed out that they release only one number on their defense expenditure—the single-line entry in the annual state budget. Even this is virtually useless as an indicator of either the size or the trend of actual defense expenditures. The level

is obviously far too small to cover all defense activities, and the trend—which shows a steady decline since 1970—doesn't fit any subset of defense activities that we have been able to identify.

Indeed, we doubt that the published figure has any consistent accounting base, at least in the 1970's. I should also point out that even if the Soviets did give us a valid and more detailed accounting of their defense spendings, we would still be faced with the difficult problem, as we are with all Soviet economic statistics, of converting the data into meaningful economic prices in order to determine such things as the real rates of growth in defense activity, the impact of defense on the economy or the priorities within defense. We also would still be left with the sticky problem of trying to convert these ruble values into dollar values in order to compare them with our own defense activities.

As Mr. Huffstutler has pointed out, we use the direct costing, or building block methodology, to estimate the costs of Soviet defense activities. We begin by identifying all of the individual programs and activities that make up the Soviet defense establishment and by describing them in great detail. We then assess the cost aspects associated with these programs and activities and sum the results. The estimates are based on the largest all source body of data on Soviet defense programs held in the intelligence community.

As mentioned previously, we do the work twice, producing results both in rubles and in dollars. We use the ruble values to assess the relationship of defense to the Soviet economy and the relative priorities that the Soviets assign to different military programs, forces, and activities. The dollar figures are used to compare the magnitude and trends of Soviet defense activities with those of the United States.

Today our discussion is focused on procurement costs. The analysis begins with estimates of the annual production of every weapon system in the Soviet Union. We then develop estimates of the cost to produce these items in the United States, using U.S. manufacturing practices and cost factors. This effort uses the most detailed information available to the intelligence community with regard to the technical characteristics of these systems and, where there is sufficient data, we call upon U.S. weapons manufacturers to develop cost estimates for these items.

When we have less data available on the technical characteristics of the systems, we rely upon U.S. analogs. Inasmuch as U.S. systems are usually technologically more advanced than Soviet systems, I believe this practice has a tendency of overpricing the Soviet item.

To estimate the ruble costs of Soviet weapons procurement we use ruble prices directly when we have sufficient information. Obviously we do not have a complete set of Soviet prices for military products and we have to extrapolate from the price information that we do have. We do this by developing ruble-to-dollar ratios for various categories and technological generations of weapons, which we use to convert from dollar prices to ruble prices.

These conversion ratios are based on a large and growing sample of Soviet prices for military products. These prices run the gamut from very small, inexpensive items to more complex and sophisticated weaponry. The sample of prices is particularly good for the most expensive

Soviet weapon systems, which make up the bulk of Soviet procurement spending.

Where possible, we check the ruble estimates for reasonableness against other intelligence information and against the published Soviet economic statistics. We believe they pass these tests.

Let me turn now to some of the results of the methodology. I believe you have a package of graphics at hand. You probably are familiar with the information presented in chart 1, which shows a comparison of U.S. defense outlays with our estimates of the dollar costs of comparable Soviet activities. The comparisons include all U.S. and Soviet military activities that are considered in the United States to have national security roles; that is:

National Security programs that in the United States would be funded by the Department of Defense;

Defense-related nuclear programs such as those funded in the United States by the Department of Energy;

Conscription;

The defense related activities of the U.S. Coast Guard and the Soviet border guards.

The following activities are not included in these comparisons:

Military retirement pay, which reflects the cost of past rather than current activities.

Space activities that in the United States would be funded by NASA.

Civil defense and military assistance programs, except for the pay and allowances of uniformed personnel engaged in such programs.

Soviet internal security troops, who essentially perform internal police functions, and the construction and transportation troops.

The estimates of Soviet activities are derived on the basis of what it would cost in the United States to develop, procure, and man a military force of the same size and with the same inventory of weapons as that fielded by the Soviets, and to operate that force as the Soviets do.

The horizontal bars on the bottom of the chart show that the estimated dollar costs of total Soviet defense activities for the 1970's as a whole exceeded comparable U.S. outlays by almost 30 percent. Moreover, the trends of the defense activities were quite different.

The estimated dollar costs of Soviet defense activities grew steadily over the entire period at an average annual rate of about 3 percent, with upward trends in nearly all the major elements of the Soviet Defense Establishment.

Calculated in constant price ruble terms, Soviet defense expenditures grew at a rate of 4 to 5 percent per year in the same period. The faster rate of growth in rubles reflects the different price structures in the two countries. The faster growing elements of Soviet defense spending have comparatively higher ruble prices.

U.S. outlays, on the other hand, declined continuously following the Vietnam peak in 1968 before turning up again in 1977 when increases in weapons procurement and R.D.T. & E. offset a continuing decline in personnel costs.

As a result of these diverging trends, the estimated dollar costs of Soviet defense activities caught up with U.S. defense outlays in 1971 and have exceeded them by a widening margin in each succeeding

year. In 1979, the Soviet total will be about $150 billion—in 1978 dollars—or about 50 percent higher than U.S. outlays.

Senator BYRD. Excuse me. Would you say that again?

Mr. BURTON. About 50 percent higher than U.S. outlays in 1979.

Senator BYRD. Are you talking about the total military expenditures?

Mr. BURTON. That is total expenditures.

Senator BYRD. Could you translate that into rubles?

Mr. Lee estimates for fiscal year 1980 that the Russians will spend 100 billion rubles. How does that compare with your estimate?

Mr. BURTON. We estimate between 58 and 63 billion rubles for 1979, but those are 1970 rubles.

Senator BYRD. They are 1970 rubles?

Mr. BURTON. Yes, sir. They are based on 1970 prices.

We believe Bill's estimates are in current rubles. We also believe that Bill's total would cover a wider range of activities than we have covered in our total, which corresponds with the U.S. definition of defense that I described earlier. Further, we believe that there is a fairly strong inflation for all machinery products in the Soviet Union, especially in military products. I think Bill quoted 9 percent average annual rate of growth in his estimate which would be about 4 percent higher than the average real annual rate of growth.

Senator BYRD. I think you gentlemen have a very difficult assignment. As you indicated earlier, the Soviets guard these programs, the cost of the programs, as well as other aspects of the programs, as a state secret, so I think it is really a bit astonishing that you can get any reasonable estimate as to what the Soviets are doing in that very closed society that they have. That is why I think it is a good idea that there is more than just one group working on this matter, because one group or individual might be able to turn up aspects that another does not see. So I do have great appreciation for the difficulties of your assignment.

I think these charts you have submitted to the committee are very dramatic.

Chart 1, "United States and Soviet Defense Activities—A Comparison of U.S. Outlays With Estimated Dollar Costs of Soviet Activities," shows the United States slightly ahead of Russia in 1970. After that time, the United States outlay has decreased, while Soviet outlay has consistently increased to a point where there is a very wide gap, according to this chart.

Now in chart 2, "United States and Soviet Defense Procurement," there is an even more dramatic drop. In 1970 the United States started out with a margin of superiority. The United States has gone consistently down, the Soviet Union has gone consistently up, and there is a very wide spread at the present time.

The third chart, "United States and Soviet Strategic Forces Procurement," is even more dramatic. Although the Soviet Union started out ahead of the United States in 1970, it has consistently widened that gap. The gap would now appear to be about double what it was then.

Chart 4, "United States and Soviet Intercontinental Attack Procurement," is also very dramatic. The Soviet Union started out with more than a slight advantage, but it went way ahead in 1974, 1975,

and 1976. The gap has narrowed slightly since then, but it is still a very wide gap. Just looking at it roughly, the gap appears about three times as large as in 1970.

Chart No. 5, "United States and Soviet General Purpose Forces Procurement," shows a tremendous difference. In 1970, The United States started out in a much stronger position than the Soviet Union. Since then, the U.S. outlay has gone down dramatically, and the Soviet Union outlay has increased dramatically. The gap now appears to be about four times the original difference.

Chart No. 6, "United States and Soviet Land Forces Procurement, shows another very dramatic difference.

Chart No. 7, "United States and Soviet Tacair Procurement," is the only chart of the eight in which the U.S. outlay is higher than the Soviet Union outlay.

Chart No. 8, "United States and Soviet Naval Procurement," again shows a very dramatic increase in the Soviet outlay versus the United States outlay.

These charts are tremendously interesting and highly significant. Can these charts be printed in the record?

Mr. TICER. Yes, sir.

Senator BYRD. Without objection, your prepared statement, along with the charts, will be made a part of the official record.

[The prepared statement follows:]

SOVIET DEFENSE PROCUREMENT TRENDS AND PROSPECTS

Mr. Chairman, it is a pleasure for us to be here today. We welcome this opportunity to share the results of our work on Soviet defense procurement activities.

This topic is treated throughout the Intelligence Community as one of our highest priority intelligence objectives. We use all available sources and methods to develop the best estimates that we can of the level and trend of Soviet defense procurement. The weapons being procured today will form the core of Soviet military capabilities throughout the decade of the 1980s and well into the 1990s. Moreover, procurement expenditure patterns provide insights into the priorities that Soviets place on individual forces and systems.

We will be as forthcoming as we can be in this open session. I am sure you appreciate the fact that this analysis involves sensitive intelligence sources and methods. We will be happy to address in writing any questions that cannot be discussed here for security reasons, or discuss them further in closed session.

OFFICIAL SOVIET PRONOUNCEMENTS ON DEFENSE PLANNING

Mr. Chairman, I wish I could present you with a set of official Soviet plans for military procurement, or at least a set of their own statistics on past spending for this purpose.

Unfortunately, in contrast to the practice in the U.S.—where weapons programs are debated freely in the open literature and past spending is a matter of public record—the Soviets carefully guard all information on their defense programs as official state secrets. Public information on Soviet defense expenditure is limited to a single-line entry in the annual state budget. Even this is virtually useless as an indicator of either the size or trend of actual defense expenditures. The level is obviously far too small to cover all Soviet defense activities. The trend, which shows a steady decline since 1970, does not appear to fit any subset of defense activities that we are aware of from other sources. Indeed, we doubt that the published figure has any consistent accounting basis.

I should point out that even if the Soviets did give us a valid and more detailed accounting of their defense spending, we would still be faced with the difficult

problem—as we are with all published Soviet economic statistics—of converting the data into meaningful economic prices in order to determine such things as rates of growth in real terms, the impact of defense on the economy, and priorities within defense. We would also still be left with the sticky problem of converting the ruble values into dollar terms for purposes of comparison with U.S. defense activities.

DIRECT COSTING METHODOLOGY

For the purposes, we use a direct costing, or building block methodology to estimate the costs of Soviet defense activities. We begin by identifying all of the individual programs and activities that make up the Soviet defense establishment and describing each in detail. We then assess all aspects of the costs associated with these programs and activities and sum the results. The estimates are based upon the largest all-source body of data on Soviet defense programs held in the Intelligence Community.

We do the work twice, producing results in both rubles and dollars. The rubles are used to assess the relationship of defense to the Soviet economy and the relative priorities assigned by the Soviets to their different military programs, forces, and activities. The dollar estimates are used to compare the magnitude and trends of Soviet defense activities with those of the United States.

Today, our discussion is focused on procurement costs. The analysis begins with estimates of the annual production of every weapon system in the Soviet Union. We then develop estimates of the costs to produce these items in the United States. Our dollar concept is the cost of producing the Soviet design in the U.S. using base year U.S. production technology and practices, input prices and profit margins. Our ability to reflect the Soviet design depends to a large degree upon our knowledge of the physical and performance characteristics of the individual weapons. When we have good data, our cost estimates capture the "austerity or complexity" of the Soviet weapon. Most of the more costly Soviet weapon systems fall in this category.

When our knowledge is less complete, we have to fall back on U.S. analogs for weapons or components. In these cases, we attempt to adjust the analog results by extrapolating from our general understanding of Soviet design practices. Some weapons—usually lower cost items—are costed on the basis of the nearest equivalent U.S. weapons.

To estimate the ruble costs of Soviet weapons procurement, we use Soviet prices directly when we have them. Our sample of prices for military products runs the gamut from very small, inexpensive items to the most complex and sophisticated weapons in the Soviet arsenal. The sample of prices is especially good for the most expensive Soviet weapons systems—aircraft, missiles, ships, etc. But our set of Soviet prices is far from complete, and most of our ruble procurement estimates are derived from our dollar cost estimates using conversion factors that reflect the relative costs of military hardware in the Soviet and U.S. economies. The size and variety of our sample of Soviet military prices permits us to develop ruble-to-dollar ratios by individual weapons category—often at the subsystem level of detail—and technological generation.

Where possible, we check the ruble estimates against other intelligence information as well as against published Soviet economic statistics. We believe they pass these tests.

ESTIMATED COSTS OF SOVIET DEFENSE ACTIVITIES

Let me now turn to the results of the methodology. You are probably familiar with the information presented in Chart 1, which shows a comparison of U.S. defense outlays with our estimates of the dollar costs of comparable Soviet activities.

The comparisons include on both sides those activities considered in the United States to have national security roles. That is,

National Security programs that in the United States would be funded by the Department of Defense.

Defense-related nuclear programs such as those funded in the United States by the Department of Energy.

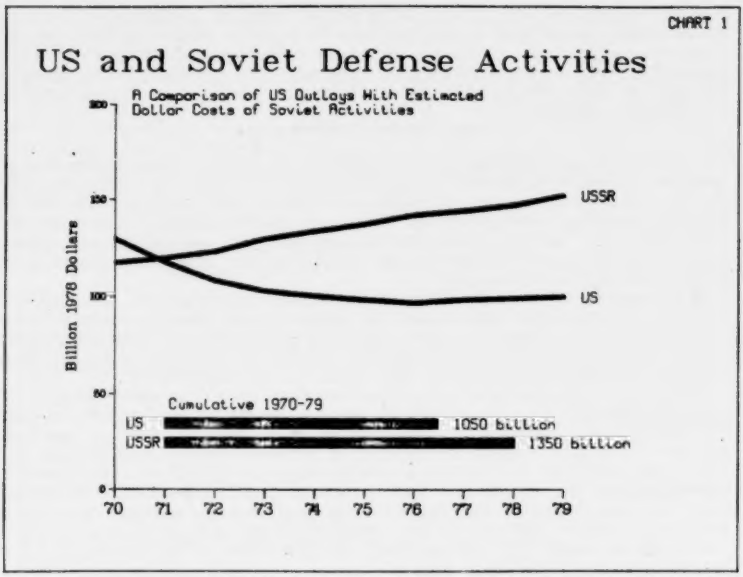


CHART 1
US and Soviet Defense Activities
A Comparison of US Outlays With Estimated Dollar Costs of Soviet Activities
Billion 1978 Dollars
USSR
US
Cumulative 1970-79
US 1050 billion
USSR 1350 billion
70 71 72 73 74 75 76 77 78 79

Conscription.

The defense-related activities of the U.S. Coast Guard and the Soviet Border Guards.

The following activities are excluded from the comparison:

Military retirement pay, which reflects the cost of past rather than current activities.

Space activities that in the United States would be funded by NASA.

Civil defense and military assistance programs, except for the pay and allowances of uniformed personnel engaged in such programs.

Soviet Internal Security Troops (who essentially perform internal police functions).

The estimates of Soviet activities are derived on the basis of what it would cost in the United States to develop, procure, and man a military force of the same size and with the same inventory of weapons as that fielded by the Soviets, and to operate that force as the Soviets do.

The horizontal bars on the bottom of the chart show that the estimated dollar costs of total Soviet defense activities for the 1970s as a whole exceeded comparable U.S. outlays by almost 30 percent. Moreover, the trends of the defense activities were quite different.

The estimated dollar costs of Soviet defense activities grew steadily over the entire period at an average annual rate of about 3 percent. (Calculated in constant price ruble terms, Soviet defense expenditures grew at a rate of 4 to 5 percent per year in the same period. The faster rate of growth in rubles reflects the different price structures in the two countries. The faster growing elements of Soviet defense spending have comparatively high ruble prices.)

U.S. outlays, on the other hand, declined continuously following the Vietnam peak in 1968 before turning up again in 1977 as increases in weapons procurement and RDT&E offset a continuing decline in personnel costs.

As a result of these diverging trends, the estimated dollar costs of Soviet defense activities caught up with US defense outlays in 1971 and have exceeded them by a widening margin in each succeeding year. In 1979, the Soviet total will be about $150 billion, about 50 percent higher than US outlays.

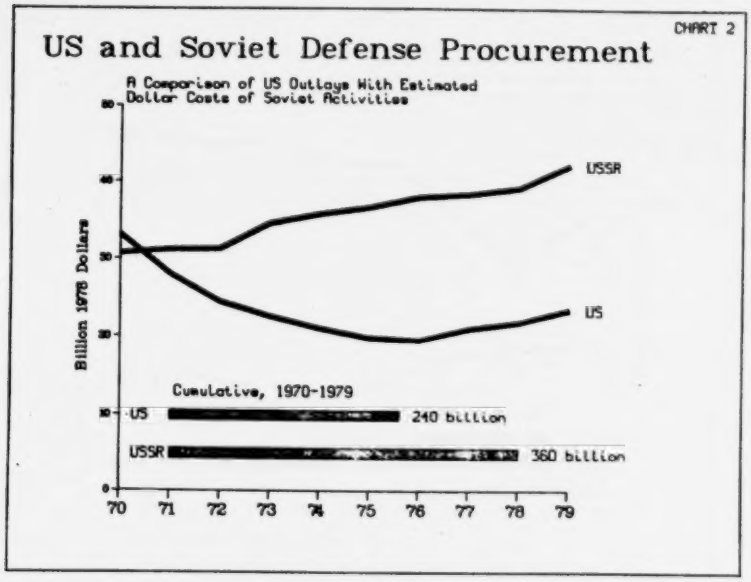
INDEX NUMBER PROBLEM

Mr. Chairman, as we have indicated on previous occasions, our dollar cost comparisons of US and Soviet defense activities have the effect of making the USSR look relatively larger than would the same comparison in rubles. This phenomenon, known to economists as the index number problem, is common to all international comparisons. Given different resource capacities, countries tend to use more of the resources for a given purpose that are relatively cheap in their economy and fewer of those that are relatively expensive. A bilateral comparison drawn in terms of the prices of one country, therefore, tends to overstate the relative value of the activities of the other.

To gauge the extent of the index problem, we have made some very rough calculations of the ruble value of US defense activities. For 1979, the relative level of Soviet to US defense activities is roughly 30 percent larger when measured in rubles.

PROCUREMENT COMPARISONS

As can be seen in Chart 2, comparison of US and Soviet procurement activities shows an even larger disparity than that of total defense activities. The horizontal bars show that the estimated dollar costs of Soviet procurements of weapons and equipment in the 1970s exceed US procurement outlays by about $120 billion, or 50 percent.



Procurement trends closely parallel those for total defense activities in the two countries. The estimated dollar costs of Soviet procurements show a monotonic upward trend in the 1970s, averaging 3–4 percent per year. (In ruble terms, the growth rate was 4 to 5 percent, reflecting the comparitively high costs to the Soviets of producing high technology weapons and equipment.) US procurement outlays fell by more than 40 percent between 1970 and 1976. For the past three years, US procurements outlays have been growing. The estimated dollar costs of Soviet procurements exceed US procurement outlays by 75 percent or more in each of the last five years.

During this period, both countries used most of their procurement to replace and modernize existing forces. Since the Vietnam War, the US has not increased its numbers of forces in any major areas. The Soviets increased their numbers of strategic missiles and tactical aircraft substantially through the mid-seventies,

but since then their efforts have been primarily for modernization rather than expansion. Important exceptions have been the addition of new ground divisions on the China border and a continuing increase in the numbers of major surface combatants in their navy.

MISSION COMPARISONS

We can also compare US and Soviet procurement programs by major missions. The comparisons presented here are organized in accordance with the January 1979 version of the Defense Planning and Programming Categories (DPPC) of the U.S. Department of Defense. The two major mission categories are strategic forces and general purpose forces. The strategic category includes intercontinental attack, peripheral attack, strategic defense, and strategic control and surveillance. General purpose forces include land forces, tactical air forces, general purpose naval forces, and mobility forces.

Strategic forces.—While strategic forces are the most publicized, they make up a smaller share of total procurement than the general purpose forces. For the 1970–1979 period, costs of strategic forces account for about one-fifth of total US procurement and one-third of total Soviet procurement.

Referring to Chart 3, we can see that cumulative estimated Soviet procurement for strategic forces over the 1970–1979 period was more than two and one half times the US total. For the past five years, estimated Soviet procurement has been more than three times US procurement.

Much of this difference is due to differences in the structure of US and Soviet strategic forces. In contrast to the US, where strategic defense forces have declined over the period, the Soviets have maintained a high emphasis on strategic defense forces to counter US and NATO strategic attack capabilities. The Soviets also maintain a large force of medium and intermediate range missiles and

medium bombers for attaching targets on the periphery of the USSR. These are forces for which we have no direct counterpart.

A more direct strategic comparison is procurement for intercontinental attack missions in the two countries. This mission includes intercontinental ballistic missile forces, submarine-launched ballistic missiles and their associated submarines, and intercontinental bombers.

The level and trend of US and Soviet procurements for intercontinental attack are depicted in Chart 4. Cumulative estimated Soviet procurement is almost twice the level of US procurement. There is a variability in annual Soviet procurements, however, do to the phasing of new weapons programs. The relatively lower level in 1970–1972 reflects the end of one generation of weapons systems, and the rise since 1972 is attributable to the introduction of the most recent generation of weapons.

General purpose forces.—This mission took more than three-fifths of total procurement in both countries in the 1970–1979 period. Chart 5 shows the level and trend of these costs for the ten years. Cumulative estimated Soviet procurement for general purpose forces was about 50 percent larger than US procurement.

The Soviet trend has been steadily upward, reflecting expansion and modernization of ground and tactical air forces, the buildup along the Sino-Soviet border and in Eastern Europe, and the increase in Soviet naval surface forces. US levels declined from the peak established during the operations in Southeast Asia, then began to recover late in the decade.

Estimated Soviet procurement for land forces was three times that of the US in the 1970s. This disparity is reflected in Chart 6 and reflects the addition of new divisions as well as an increase in the size and equipment holdings of Soviet divisions. US procurement declined largely as a result of force reductions following the withdrawal from Southeast Asia before turning up again in 1977.

CHART 4

US and Soviet Intercontinental Attack Procurement

A Comparison of US Outlays With Estimated Dollar Costs of Soviet Activities

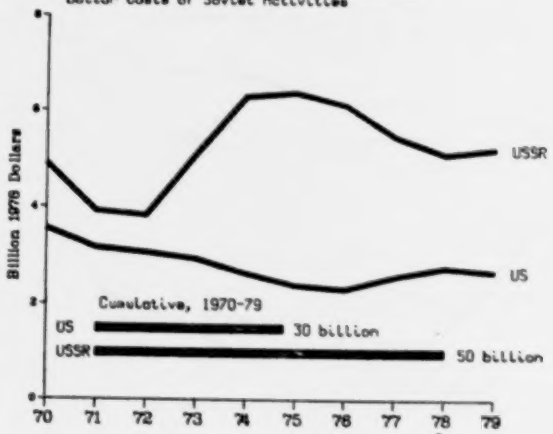


CHART 5

US and Soviet General Purpose Forces Procurement

A Comparison of US Outlays With Estimated Dollar Costs of Soviet Activities

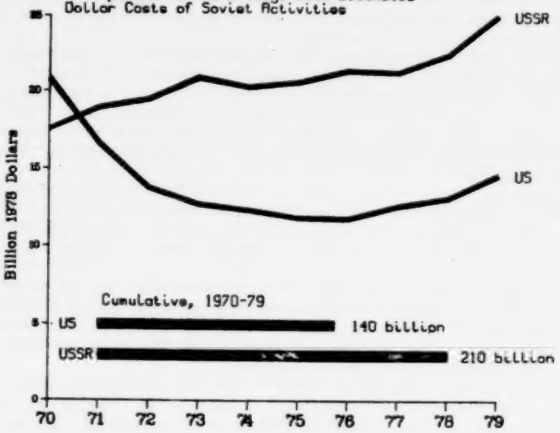


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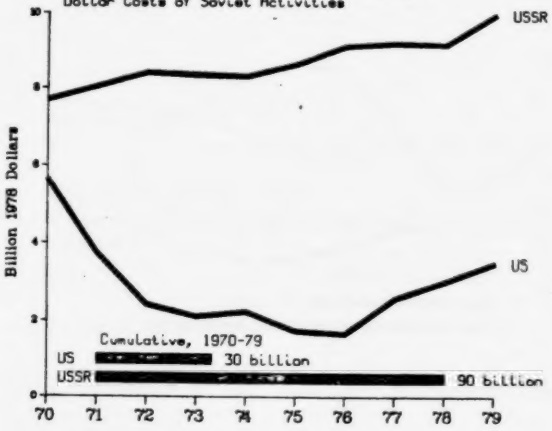
CHART 6

US and Soviet Land Forces Procurement

A Comparison of US Outlays With Estimated Dollar Costs of Soviet Activities



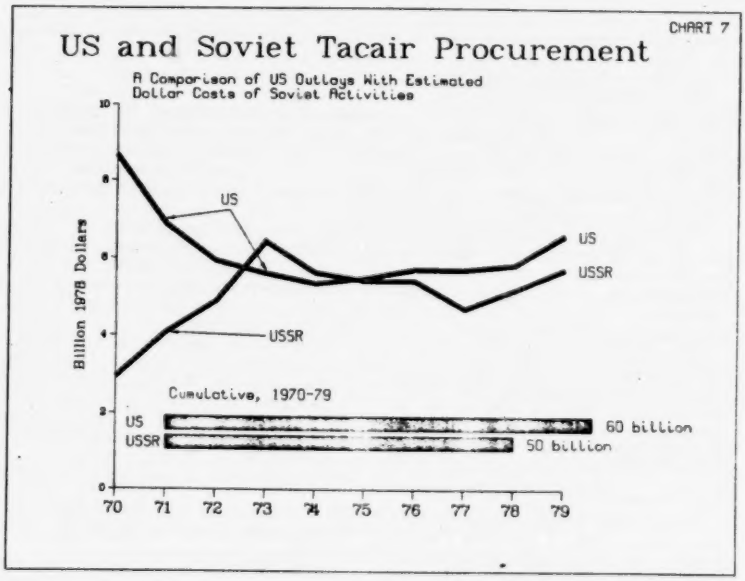
13

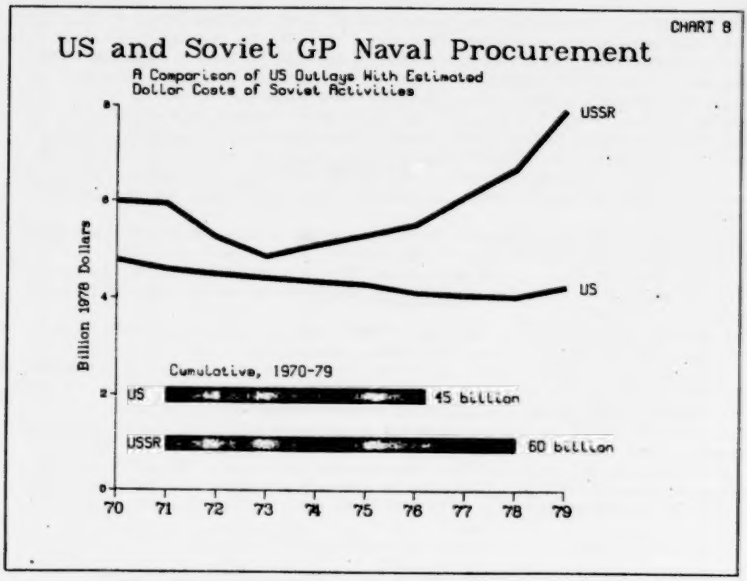
The tactical air forces mission consists of all land- and sea-based fixed wing aircraft that are used in a combat role and, on the US side, multipurpose aircraft carriers. (These carriers are included in this mission to accord with the DPPC definitions.) Helicopters used for ground attack are not included, nor are those aircraft and aircraft carriers which have an ASW mission.

During the ten years, US tactical air forces procurement was about one-fifth larger than estimated Soviet procurement. Although the Soviets delivered more aircraft to its tactical forces, US procurement costs are higher because its aircraft are bigger and more complex than Soviet aircraft, and because US costs include the costs of multipurpose aircraft carriers, for which the Soviets have no counterpart.

Chart 7 shows US procurements decline after the Southeast Asian War, then grow as A–10s, F–14s, F–15s, and F–16s were added to the force. The introduction of the Flogger, Fencer, and late model Fishbeds and Fitters are responsible for the substantial rise in estimated Soviet procurement at the beginning of the period.

The general purpose navy mission includes major surface combatants over 1,000 tons, minor surface combatants, attack submarines, ASW aircraft and carriers, amphibious warfare ships, and naval forces directly supporting the fleets. From 1970–1979, the estimated Soviet procurement costs exceed those of the US by one-third. As shown in Chart 8, US procurement levels have declined slowly over the period as fewer and fewer ships were delivered. Soviet procurement grew over the last half of the period as they purchased over 65 attack submarines, about 100 major surface combatants, and nearly 350 ASW aircraft. The large increase in 1978 and 1979 reflects the leading edge of the costs for major new ship procurement programs which will be entering the fleets in the 1980s.





16

PROSPECTS FOR FUTURE SOVIET DEFENSE PROCUREMENT

Mr. Chairman, I would like now to turn to a discussion of the prospects for future Soviet defense procurement. This issue is closely related to that of Soviet economic prospects. As you know, Soviet economic growth has been slowing during the 1960s and 1970s. We believe that the slowdown will continue and even worsen in the 1980s. We must take this forecast into account in discussing the prospects for Soviet defense procurement.

The coming Soviet political succession will also affect the prospects for defense spending. We lack good evidence on the makeup of the post-Brezhnev leadership. But the economy's poor performance will mean that the level of defense spending is likely to become more of an issue in the leadership. On the other hand, the influence of the military and the defense industrial establishment is likely to be particularly strong during the period of political transition.

Other factors that will affect future Soviet defense procurement are the Soviet perceptions of the international environment in the 1980s and requirements for further development of their military forces. The Soviets continue to be concerned about the Chinese threat and are worried by NATO efforts to increase defense spending. They almost certainly will feel a need to try to counter planned US strategic programs for cruise missiles, more advanced SLBMs and the M–X.

EVIDENCE ON SOVIET PLANS FOR FUTURE DEFENSE SPENDING

While these complicating factors make it difficult to forecast the future, the process is aided by the fact that, over the next five years or so, Soviet procurement expenditures will be determined primarily by programs already in train and identified by intelligence. Evidence on the momentum of military production programs now underway, on weapons systems in flight test or trials, and on capital construction in the defense industries, therefore, provides a basis for projecting Soviet defense expenditures in this period.

We have closely monitored activities at Soviet weapons production plants and design bureaus and see no evidence to date that economic difficulties have altered their momentum.

The Soviets now have about the same number of major weapons systems in production that they have maintained since 1970. Nearly three-fifths of these have been introduced in the last five years, and production of most of them will continue into the 1980s.

Evidence on activities at Soviet weapons test facilities indicates that the number of Soviet strategic and general purpose weapons in flight test or trials is also about the same as the average since 1970. Soviet design bureaus also appear to be maintaining a high level of activity in the development of follow-on weapons.

These consistently high levels of activity have important implications for growth in defense spending, for new weapons have tended to be more costly than their predecessors. This is especially true of sophisticated high technology systems such as follow-on ballistic missiles, high performance aircraft, and advanced naval ships which the Soviets now have under development.

Historically, we have observed a strong correlation between the completion of capital construction in the defense industries and subsequent upswings in the rate of growth of defense spending. The amount and type of construction now under way indicate that another cyclical increase in defense spending is likely in the early to mid-1980s, as the new industrial capacity comes on stream.

FORECAST

This evidence strongly suggests that total Soviet defense spending—and spending for military procurement in particular—will continue to increase in rail terms at least through 1985. The programs we have identified imply a rate of increase in ruble outlays for military procurement at or near the long-term 4 to 5 percent average rate, and in dollars a continuation of the 3 to 4 percent procurement growth trend.

The evidence indicates further that force modernization, rather than expansion will be the principal determinant of Soviet defense procurement in the 1980s. We expect only slight increases in the overall size of Soviet forces and even decreases in some areas—for example, the strategic attack force reductions that would be required under SALT II. But we project a continuing across-the-board improvement in force capabilities as new, costly weapon systems are introduced. These will include new land- and sea-based strategic missiles, tactical and air defense aircraft and missiles, ground forces armaments, and general purpose naval ships.

Continuing economic difficulties would give the Soviets a greater incentive to moderate the growth in defense spending. They could make marginal alterations in some of the current production programs we have identified or take greater advantage of potential savings from arms control than they have done in the past. Such modest reductions might require the Soviets to delay force improvements in selected areas, but probably would not significantly slow the overall rate of modernization of the Soviet armed forces.

Finally, decisions that they make from now on on new military programs—which would affect defense spending in the late 1980s—may reflect greater concern for the military drain on the economy. But we think it unlikely that economic problems will force the Soviets to reverse their commitment to continuing improvement in their military forces.

Senator BYRD. I want to thank you on behalf of the committee for these charts, because I think it puts what has occurred, particularly in the procurement field in these last 10 years, into a very dramatic form. Please proceed, Mr. Burton.

Mr. BURTON. Thank you, sir.

I could go through and discuss each of these different comparisons if you would like.

Senator BYRD. I don't believe that is necessary. I think the charts speak for themselves.

Mr. BURTON. Most of them do that.

Mr. HUFFSTUTLER. Mr. Chairman, if I may make a point, the dollar estimates this morning came under heavy attack; but the reason

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that we try to make a dollar estimate—even with all of the difficulties that are entailed in trying to do so—is so that we can draw this kind of comparison. There is no way that we can compare a ruble-based curve with a dollar-based curve; they are not comparable. It is to try to make these types of comparisons that we turned to developing dollar estimates in the first place.

Senator BYRD. I think we need to assume that your figures are reasonably accurate and it shows a very sharp increase in all areas except TACAIR with the favorable side being with the Soviet Union. If Mr. Lee's figures are accurate, the divergence would be even greater. In any case, it is very great.

Mr. BURTON. Perhaps, Mr. Chairman, now we could talk about what we see as the prospects for future procurement in the Soviet Union.

Senator BYRD. Yes.

Mr. BURTON. What we have been talking about so far is history. In short we expect more of the same.

Senator BYRD. That is significant in itself.

Mr. BURTON. I would like to discuss the prospects for future defense procurement. This issue, of course, is closely related to the issue of Soviet economic prospects.

As you know, Soviet economic growth has been slowing during the 1960's and 1970's. We believe that the slowdown will continue and even worsen in the 1980's. We must take this forecast into account in discussing the prospects for future Soviet defense procurement.

The coming Soviet political succession will also affect the prospects for defense spending. While we lack good evidence on the makeup of the post-Brezhnev leadership, we can expect that poor performance of the economy will mean that the level of defense spending is likely to become more of an issue for the leadership in the future. On the other hand, the influence of the military and the defense industrial establishment is likely to be particularly strong during the period of political transition.

Other factors are the Soviet perception of the international environment and requirements for future development of the Soviet forces. The Soviets continue to be concerned about the Chinese threat and are worried by NATO efforts to increase defense spending. They must try to counter planned U.S. strategic programs for cruise missiles, more advanced SLBM's and the M–X.

Now, let's take a look at the evidence bearing on future trends in Soviet plans for defense spending. The military programs currently underway will determine the pattern of Soviet defense spending at least through the mid-1980's. Therefore, evidence on the momentum of current production programs, on weapons systems in flight test or trials, and on capital construction activities in the defense industries provides a good basis for projecting Soviet defense expenditures in this period.

We have closely monitored activities at Soviet weapons production plants and design bureaus and see no evidence to date that economic difficulties have altered their momentum.

Senator BYRD. That is a very significant statement.

Mr. BURTON. Yes, sir.

The Soviets now have about the same number of major weapons systems in production that they have maintained since 1970. Nearly three-fifths of these have been introduced in the last 5 years and production of most of them will continue well into the 1980's.

Senator BYRD. What percentage of Soviet gross national product do you believe will be devoted to defense—in the broadest sense of that term—during the period 1980 to 1985?

Mr. BURTON. Senator, we estimate right now, in constant 1970 prices, that the defense activities that are comparable to those that we classify as defense in the United States take up some 11 to 12 percent of gross national product.

Senator BYRD. Your figure is much lower than Mr. Lee's figure.

Mr. BURTON. Yes.

Senator BYRD. He estimates 18 percent at the present time and that it may go to 20.

Mr. BURTON. Yes. We expect that if the defense expenditures continue at the pace that they did the last decade and GNP slows to about 2 percent, which is a possibility, that by 1985 the share of GNP will increase to between 13 and 15 percent. So we are not as far different from Mr. Lee as the 11 and 12 versus the 18 percent.

Senator BYRD. Using fiscal year 1980 now versus 1970, he estimates that Russian military expenditures have doubled during that 10-year period. Does that roughly coincide with your figure?

Mr. BURTON. No. We estimate that over the 10 years they grew 4 to 5 percent per year which is something like 50 to 60 percent.

Senator BYRD. Sixty-five percent, I guess.

Mr. BURTON. Again ours is in constant 1970 rubles.

Senator BYRD. Now of the total Russian military expenditures for 1979 or 1980, whichever period you want to use—what percent do you estimate will be for procurement?

Mr. BURTON. That varies whether you are talking in ruble terms or dollar cost terms. I think it is about 50 percent in ruble terms. In dollar terms that comes out to something on the order of 30 percent.

Senator BYRD. But both you and Mr. Lee seem in agreement that in ruble terms—and that is what the Russians will be spending in—that 50 percent of their total budget will go for procurement.

Mr. BURTON. Yes, sir.

Senator BYRD. What percent do you estimate will go to personnel costs?

Mr. BURTON. I have some figures for the period 1968 through 1978 in front of me, and in rubles we estimate about 15 percent is devoted to personnel costs.

Senator BYRD. Again, that is the same as Mr. Lee's estimate, roughly.

Mr. BURTON. Yes. That compares with the U.S. percentage of about 30 percent the way we have described the United States.

Senator WARNER. Wait a minute.

Mr. BURTON. We, for example, don't have retirement pay in our numbers. Ours contain just pay and allowances.

Senator WARNER. Can we isolate this, Mr. Chairman, because our staff provides the committee with a figure of 50 percent and 9 percent taken out of the pension.

Mr. BURTON. Yes, sir; that is a matter of definition.

Senator WARNER. I don't think it is a matter of definition at all; if you say how much, 30 percent?

Mr. BURTON. Yes, sir, in dollars we have 30 percent for U.S. personnel and 37 percent——

Senator BYRD. The Secretary of Defense has been saying for the last several years, even as far back as when Melvin Laird was Secretary of Defense—how long ago was that—that it was 57 percent? I have been using 60 percent. I think I am more nearly correct than the Secretary of Defense is on that figure, and yet you are talking about 30 percent.

Mr. BURTON. Yes, sir, it is a matter of what is included.

Senator BYRD. We are talking about personnel and personnel-related costs, and you put that at 30 percent?

Senator BYRD. Yes, but our number is simply pay and allowances.

Senator BYRD. Is that how you compute all of your figures? We know pretty well what our own personnel costs are, and that percentage is way above the figure you say it is.

Mr. BURTON. Yes, sir, our number is comparable to a 30-percent number. Other costs we would carry under operating costs—our number would be bigger on the Soviet side if we took into account the activities that are defined to include those costs which comprise the 60 percent on the U.S. side.

Sir, this is a very technical discussion and we could provide the figures for the record.

Senator BYRD. I don't believe it is a technical question. This is about the least technical of all the things that we could discuss. Weapons systems are technical, but there is nothing technical about these dollars-and-cents figures.

Mr. BURTON. No, sir, I mean that the accounting rules we have used are what are technical.

Mr. HUFFSTUTLER. I think we perhaps should start over. We are not arguing that the personnel costs as carried by the U.S. Department of Defense are 30 percent. What we are trying to show is if you account for certain elements of the Soviet pay costs and you compare those with direct counterparts in the United States, that excludes a lot of the personnel costs that are borne by the U.S. Department of Defense and which appear in the figure that you are quoting. If you exclude substantial portions of that in order to make the two numbers include comparable activities, the pay and allowance numbers come out at a lower level.

The DOD sum aggregates a good many more costs than the ones we are talking about here. We are aware of what the U.S. manpower costs are as borne by the Department of Defense. It is just that we are defining two categories which are comparable in the United States and U.S.S.R. in trying to build up this overall defense aggregate.

Senator BYRD. As you know from my earlier comments, I am very sympathetic with the problem the CIA faces in getting information on these matters. I have a high regard for the CIA, but I must say that my confidence is shaken a bit in your reply to my last question on personnel costs. I don't know how to judge your figures now, because we certainly know what the personnel and personnel-related costs are for the U.S. Government, and they are just about double what you put them to be.

Senator WARNER. Mr. Chairman, if I might interject just a minute. You see, we have a responsibility to the public to explain the importance of the additions that Congress is presently considering for the national defense budget, and we are struggling to portray to the American public what the Soviets are doing, what we are doing and what we should be doing.

Now the Secretary of Defense comes up annually and gives us personnel costs. As the chairman says, they range in the area of 58 to 60 percent. Now we can't suddenly have another segment of the Federal Government coming in using a different calculation; it begins to distort it in the minds of the public.

Can't the CIA and the Department of Defense agree upon a definition of what personnel costs are and use that definition? Maybe you come up with different calculations but at least the methodology is comparable. Now are you familiar with the methodology used by the Department of Defense to arrive at this calculation of roughly, as the chairman says, 60 percent or 59 or whatever it may be?

Mr. BURTON. Yes, sir.

Senator WARNER. Then using that methodology, what is the figure that your agency comes up with?

Mr. BURTON. For defense?

Senator WARNER. Yes.

Mr. BURTON. For U.S. defense?

Senator WARNER. Yes.

Mr. BURTON. Well, we have not made that calculation. The way we come up with our numbers is——

Senator WARNER. Fine. Let's put that to one side. Can you provide the committee then with the calculation using the same methodology as the Department of Defense?

Mr. BURTON. Certainly.

Mr. HUFFSTUTLER. Certainly.

Senator WARNER. I think that is the important thing, Mr. Chairman.

Mr. HUFFSTUTLER. We will provide that.

Senator WARNER. I presume the previous witness in providing the committee with the 12 percent was using that comparable to the Department of Defense which comes up to the 60-percent figure.

Mr. HUFFSTUTLER. No; that is not so.

Mr. BURTON. I don't think so.

Senator WARNER. Certainly the public is in here today and I don't know how the press will treat this but that was a 5-to-1 disparity between what the United States is spending on manpower and what the Soviets spend. Anyone sitting in the room could have walked out with that impression.

Is that correct, Mr. Chairman?

Senator BYRD. That was certainly the impression that the Chairman had.

Senator WARNER. Now the Central Intelligence Agency comes in and puts the figure 30 percent on the table as compared with Mr. Lee's 12 percent.

Mr. BURTON. No, sir. Fifteen percent is what we gave.

Mr. HUFFSTUTLER. Mr. Chairman, may I give you an example. We don't want to delay you and we will provide in writing the comparison you are asking for. For example, in the Soviet defense budget, military

retirement does not appear, it is not carried. It is carried in another part of the State budget. It apparently is not carried as an expense by the Ministry of Defense. In this country military retirement is carried as a part of the obligation of the Department of Defense. So you have some asymmetries in the two accounts between the Soviet Union and the United States. What we were trying to do with these numbers is show what you would get if you added the same elements into both ledgers.

If you wish the calculation that would show how it would appear in the Soviet ledger if it were calculated the same way that it is calculated in the United States, we will do that for you and submit it later.

Senator WARNER. You are familiar with Albert Wohlstetter and how he went back and traced your estimates, compared to the reestimate for the Department of Defense and, I think, your own agency in the period of the early 1970's. This challenges the figures today. I think your agency and the Department of Defense said you were as much as 100 percent off in the early 1970's. Am I correct in that?

Mr. HUFFSTUTLER. I believe what you saw was the 10-year projection, the comparison of the "out" years and the 10-year projection. The sorts of things that are done best in the intelligence community are the things that are either past or current. For the purposes of supporting U.S. defense planning, we are asked to forecast, for example, the number of ICBM's by model, by launcher; the number of aircraft by site, by regiment. We are asked to forecast the number of ships by type, by fleet. You know, there are some things that you can see in the pipeline coming along, there are systems that you can see in development. By the time one gets out into the 10th year it is very difficult to forecast where another country, who tries to keep this in secrecy, is going to be; indeed, it is something of a challenge to project U.S. programs 10 years in the future.

Senator WARNER. In the past you have been consistently in error, is that correct?

Mr. HUFFSTUTLER. That is not correct.

Senator WARNER. That is not correct?

Mr. HUFFSTUTLER. No; that is not correct.

Senator WARNER. How about repeatedly low?

Mr. HUFFSTUTLER. The 10-year projections for ICBM's, I think the article argues, were low. There were a number of other categories which were high.

Senator WARNER. What about the overall Soviet expenditures?

Mr. HUFFSTUTLER. No; Wohlstettler's article does not discuss expenditures.

Mr. BURTON. No, this was not an expenditures issue at all.

Senator WARNER. What about the programs and the threats though?

Mr. Chairman, I must leave. I will provide the questions for the record and then you will have an opportunity to answer them.

Thank you, Mr. Chairman. I congratulate the Chair on holding this hearing. I think we have a lot of work to do in this area.

Senator BYRD. Thank you, Senator Warner.

What degree of accuracy do you attach to your estimates of Soviet defense expenditures?

Mr. BURTON. Well, Senator, we think that in the area of dollar costs we are probably within plus or minus 10 percent on the aggregate

for the period in the late 1970's. We are probably a little bit less accurate as we move back into the 1960's. I would say it is about plus or minus 15 percent on those activities.

With respect to our ruble estimates we believe that the correct ruble expenditure in 1978, for example, lies within the spread that we gave.

Senator BYRD. Have Russian manpower costs risen at a rate comparable to the rate of increase in the United States?

Mr. BURTON. Do you mean pay and allowances, sir?

Senator BYRD. Total manpower cost.

Mr. BURTON. Well, total manpower costs have grown in the Soviet Union over the 1960's and into the 1970's because the number of men have increased. When we cost them we attempt to get them into constant prices so our manpower costs grow more or less proportional to the size of the force. If you are asking whether the Soviet military wages have grown; yes, they have grown some.

Senator BYRD. I must say I am a bit shook up about your estimate of what the U.S. manpower costs are as a percentage of the total defense budget. I don't want to impose on the agency, but this subcommittee will have another hearing on November 8 on this same subject. Could you come back at that time? In the meantime could you attempt to solve the question on these manpower figures—your figure being totally different from anything that we have seen for years.

Mr. BURTON. Sir, I think we could clear that up most easily in writing.

Senator BYRD. I don't believe in doing it that way. I would not have the opportunity to question the figures. As I say, I don't want to impose on you, but I would like to have us resume this session a week from today.

Mr. Huffstutler, as director of the effort, could you do that?

Mr. HUFFSTUTLER. Certainly, we would be happy to do that.

Mr. BURTON. Yes.

Senator BYRD. I do have other questions that I have not had an opportunity to ask.

I want to thank each of you for being here this morning and I appreciate your willingness to come back next week.

Mr. Burton, your complete statement has been inserted in the record.

Mr. BURTON. Thank you.

Senator BYRD. I assume that is satisfactory to you.

Mr. BURTON. Yes, sir. I might like to edit it a little since it came off the typewriter very quickly yesterday afternoon.

Seator BYRD. That is all right.

[Questions with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR HARRY F. BYRD; ANSWERS SUPPLIED BY THE CENTRAL INTELLIGENCE AGENCY

Question. Do independent estimates support or confirm the validity of your methodology used in estimating Soviet defense expenditures?

Answer. We have checked our direct costing estimates of Soviet defense spending against estimates based on analysis of Soviet statistics. While recognizing the uncertainties and margin for error involved in the estimates based on Soviet statistics, we nevertheless have found that our direct costing estimates fall well within the range of values established by our analysis of Soviet statistics.

[Deleted.]

We also have examined the estimates of Soviet defense spending published by Mr. William T. Lee. His estimates, which are based on analysis of Soviet sta-

tistics, often differ considerably from ours. As we noted in the answer to another question, we believe Mr. Lee's estimates cannot be substantiated on several important points.

Question. What degree of accuracy do you attach to your estimates of Soviet defense expenditures?

Answer. Estimated dollar costs: Our dollar calculations estimate what it would cost to produce and man in the United States a military force of the same size and with the same weapons inventory as that of the U.S.S.R. and to operate that force as the Soviets do. We would need complete knowledge about the structure, performance, size, and cost of various Soviet forces to produce this hypothetical measure perfectly. Of course, we do not have perfect knowledge, but we do have a substantial understanding of the Soviet forces. As a result, we believe our estimate for total dollar costs of Soviet defense activities is unlikely to be in error more than plus or minus 10 percent in the current period to plus or minus 15 percent in the early years.

Estimated ruble expenditures: Our ruble estimates of total Soviet defense activities are expressed as a range. We believe the actual cost of Soviet defense activities (valued in constant 1970 rubles) is unlikely to lie outside that range. As with the dollar cost, we are more confident in our estimates for higher levels of aggregation.

Question. Does the CIA direct costing approach use available Soviet data on their defense budget? To what extent?

Answer. We analyze the published defense budget and, together with other Soviet statistics which include funds that might be available for financing defense activities, use this information as a check on the reasonableness of our estimates.

Question. According to CIA estimates, the Soviets have been, since about 1971, spending more for military procurement than has the United States. Considering that the Soviets have more than twice the number of military personnel, are the Soviets spending, in the investment area for general purpose systems, more per man in uniform than the United States?

To estimate procurement costs per man for general purpose forces, we have divided the respective U.S. and U.S.S.R., procurement totals by their manpower counterparts. Dollars are used for these comparative calculations.

For the last 5 years, Soviet procurement costs per man for general purposes forces are just slightly less than those of the United States. This represents a substantial change from the late sixties when U.S. per man procurement costs within the general purpose forces were nearly twice the comparable Soviet estimate. The present rough equivalence reflects large cutbacks in U.S. per man procurement costs following the Vietnam war and a gradual growth in Soviet procurement costs per man since the late sixties.

For both countries, the procurement costs per man in uniform for land forces are much lower than for tactical air or naval forces in 1979. While the Soviet ratios are higher than the U.S. ones for tactical air or naval forces, the preponderance of land forces in the U.S.S.R. brings down the average procurement per man ratio for Soviet general purpose forces to slightly less than that of the United States.

As you know, we do not regularly report our procurement data on a per man basis. The per man ratios calculated for this question fluctuate substantially over time and within mission components. Therefore, we believe these per man ratios are not useful measures of the "capital intensity" of the forces.

Question. Would you describe the Soviet funding for military investment, particularly with respect to general purpose forces, as going for expansion or modernization of forces?

Answer. Since at least 1968, the Soviets have been modernizing their forces across the board and in selective areas, this modernization has been accompanied by force expansion as well. [Deleted.]

The Soviets use armed forces personnel for a broader range of activities than the United States does. Counting only those functions which are considered in the United States to be for national security, Soviet armed forces personnel increased from 3.7 million in 1968 to 4.2 million in 1978—a 14-percent increase over the decade. Land forces accounted for 300,000 of the total 500,000 troop increase.

Question. In 1975, the Central Intelligence Agency made a significant upward revision of estimates of Soviet defense expenditures. What were the reasons for the 1975 revision? Did the 1975 revision occur because of estimated changes in quantities of equipment and personnel? Did the 1975 revision occur because of underestimates of technological complexity of Soviet weapons systems?

Answer. In 1976, the CIA published an estimate of Soviet ruble spending for defense which was about twice as high as the estimate made for two years earlier. The principal reason for the change was new information indicating that ruble prices of Soviet military hardware were substantially higher than we had previously thought. This accounted for about 90 percent of the increase. The remainder of the increase was due to changes in our estimate of observed defense activities.

The higher ruble prices were an indication that Soviet defense industry was less efficient in its use of resources than we had believed. We did not, however, underestimate the technological complexity of the weapons systems themselves. We now believe that our earlier estimates failed to capture the substantial inflation in the Soviet defense industries which was reflected in their 1967 price reform and the inefficiences of Soviet industry in producing high technology weapons.

Question. Why are your Soviet defense expenditures expressed in dollars rather than rubles?

Answer. Estimates of Soviet defense activities are prepared in both dollars and rubles. Dollars are used as a common denominator to allow comparative sizing of the U.S. and U.S.S.R. military establishments. They thus provide a general appreciation of the relative magnitude of the defense activities of the two countries. Dollar cost data also provide a means of aggregating elements of each country's military program into comparable categories and thus can show trends and relationships between the two defense establishments that are difficult to discern and measure in other ways. Dollars have the additional advantage of being familiar to U.S. defense planners.

We do use rubles, however, whenever we wish to analyze the Soviet commitment of resources to its military forces or the burden of such spending on the Soviet economy.

Question. Do your Soviet investment estimates exclude equipments produced by the Soviet Union for other Soviet Bloc countries?

Answer. Yes, equipment produced by the Soviet Union for other Warsaw Pact countries is excluded from our estimates. The estimates do include procurement for Soviet forces stationed in other Warsaw Pact countries. The estimated costs of equipment procured by the Soviets from their allies are also included in our estimates.

Question. If uniformed personnel costs are excluded from the U.S. and Soviet totals, the estimated dollar costs of Soviet defense activities are stated by CIA to exceed U.S. outlays in 1978 by 25 percent but are approximately the same as U.S. outlays for the 1968–78 period. If those facts are accurate, there does not seem to be a great imbalance in military effort especially in long term imbalance. Would you comment on those statements?

Answer. It is true that our estimate of Soviet defense activities exclusive of uniformed personnel costs for the 1968–78 period is approximately equal to comparable U.S. outlays for the same interval when both are measured in constant dollars. However, this apparent equality in effort holds only for the 1968–78 time period. This is because trends in defense activities and costs in the United States and the U.S.S.R. have been dissimilar during the 1960's and 1970's: annual U.S. defense outlays exceeded those of the Soviet Union in the 1960's but have dropped since 1968, whereas the Soviet effort—indexed in constant U.S. prices—has risen steadily. Beginning in 1972, the level of resources allocated annually by the Soviets to defense activities (less costs of uniformed personnel) started to exceed comparable U.S. outlays. Since 1975, the estimated dollar costs of these Soviet activities have been at least 25 percent greater than comparable U.S. outlays.

It might be noted that a considerable portion of U.S. outlays in the late 1960's and early 1970's were directly related to the Vietnam War. Subtracting the U.S. DOD Comptroller's estimates of the costs of our Southeast Asian involvement from the U.S. expenditure data causes cumulative U.S. defense outlays for the 1968–78 period to shrink to about 85 percent of estimated Soviet activities.

We should emphasize, however, that in our comparisons we are using the dollar costs of resource inputs as a measure of the magnitude of the defense effort. Military effectiveness, however, depends on other considerations, including the size of the forces in place, operating proficiencies, logistical support and the quality of the military personnel. Thus, although Soviet defense activities measured in dollar terms have surpassed those of the United States in recent years, this differential should not be translated directly into a measure of relative military effectiveness.

Question. Are Soviet rubles considered to be international currency? If not, how can you accurately translate rubles into dollars?

Answer. Soviet rubles are not considered to be international currency as they are not convertible and exchange rates between rubles and other currencies cannot be used as a measure of relative purchasing power. This is because the Soviet economy is controlled and exchange rates between rubles and other currencies are fixed by the Soviet officials, whereas exchange rates between international currencies are determined by supply and demand for goods and services traded internationally and by international capital transactions. Thus, even if the rubles were convertible, the exchange rate could not be used to estimate defense spending.

We do not, as a rule, convert ruble data on Soviet defense spending to dollar terms. Rather we do the opposite—we first estimate what it would cost in dollars to reproduce Soviet defense programs in the United States, and then convert these costs to ruble terms. For this purpose, we develop purchasing-parity ratios (ruble/dollar ratios). The ratios reflect the number of rubles required to purchase the same quantity of a particular type of military goods that could be bought in the United States with one dollar. The ratios are based on a research effort that has extended over many years, on a sample of ruble prices for military products and on estimates of what it would cost in dollars to produce those products in the United States. For that portion of our ruble estimates which are not derived initially in rubles, these ratios are applied to our dollar cost estimates to derive estimates of the remaining elements of total Soviet defense expenditures.

Question. Is it your opinion that Soviet defense expenditures will continue to increase through the 1980's?

Answer. We believe that Soviet defense spending will continue to increase in real terms at least through 1985. In the longer term, growing economic difficulties may push the Soviet leaders to reexamine their plans with a view to reducing the growth of defense spending, but we think it unlikely that economic problems will force the U.S.S.R. to reverse its longstanding policy of continuing to improve its military capabilities.

Question. How would you portray the comparative burden of defense expenditures on the Soviet and U.S. economies?

Answer. There are several different measures of "burden of defense expenditures" but the one most commonly used measures burden by expressing defense expenditures as a percent of GNP. (This calculation should be made in terms of indigenous currencies.) In terms of dollars, the United States currently spends slightly less than 5 percent of its GNP on defense. In terms of rubles, we estimate the U.S.S.R. spends 11–12 percent of its GNP on defense when defense spending is defined as in the United States. Defined more broadly, as Soviet practice appears to require, Soviet defense consumes about 12–13 percent of GNP.

Question. Can the Soviet economy, in your judgment, sustain the current rate of military effort through the 1980's?

Answer. By international standards, the Soviet economy is large, and the country's leaders command substantial economic resources. Even taking into account the economic difficulties projected for the U.S.S.R. during the 1980's, there is little reason to doubt that, barring a catastrophe, the economy could sustain through the 1980's the military effort implied by the current 4 to 5 percent growth rate in defense spending. We have already stated that evidence currently available to us indicates that this approximate trend will be continued through 1985. For the period of the late 1980's, there may be a greater incentive to moderate the growth of defense spending because of the projected slower economic growth. Nevertheless, economic factors should not, in themselves, force the Soviet leaders to reverse their longstanding policy of continuing to improve their military capabilities.

Question. Your estimates of Soviet defense expenditures are in constant dollars. Is the Soviet economy subject to inflation, and if so, what in your judgment is the Soviet rate of inflation?

Answer. It is very difficult to estimate an overall rate of inflation in the Soviet economy. The price indexes published by the Soviet Government are demonstrably inadequate to capture inflationary effects. Clearly, Soviet prices have not been increasing at anywhere near the double-digit inflationary rates plaguing many Western economies. On the other hand, prices are not stable in the Soviet Union, nor are they falling as the Soviets would have us believe. Based on the evidence that we have—studies of price movements in individual sectors

of the economy—the overall rate of inflation over the last 15–20 years could have averaged 1.5–3 annually.

While strict control over prices is a basic tenet of the Soviet economic system, enterprises are able to push up prices in various illegal ways. The most widespread is the practice of making a cosmetic change to a product, e.g., putting a new label on a bottle of vodka, and raising its selling price.

Various studies by Western and Soviet economists show prices to be increasing in the Soviet Union. For example, Dr. Abraham S. Becker of the Rand Corporation estimates that machinery prices increased at an average annual rate of about 2 percent over the 1958–70 period.

The Office of Economic Research of CIA has recently completed a detailed study of machinery prices in the Soviet Union. The findings of this study indicate that machinery prices increased at an annual rate of 2.6 percent if averaged over the 1960–73 period.

We believe inflation in the defense industries to be equal to or even greater than that in economy as a whole, although we have no quantitative estimate.

Senator BYRD. Thank you, gentlemen, very much. The committee will stand adjourned.

[Whereupon, at 10:55 a.m., the subcommittee adjourned to reconvene at the call of the chair.]

SOVIET DEFENSE EXPENDITURES AND RELATED PROGRAMS

NOVEMBER 8, 1979

U.S. SENATE,
SUBCOMMITTEE ON GENERAL PROCUREMENT
OF THE COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The subcommittee met at 9 a.m. in room 1114, Dirksen Senate Office Building, Senator Harry F. Byrd, Jr. (chairman) presiding.

Present: Senators Byrd and Warner.

Committee staff present: Don L. Lynch, professional staff member; John T. Ticer, chief clerk; Lynn E. Cowart, clerical assistant.

Also present: Quentin Crommelin, assistant to Senator Byrd; John Stirk, assistant to Senator Morgan; Christopher Lehman, assistant to Senator Warner, and Mike Donley, assistant to Senator Jepsen.

Senator BYRD. The Subcommittee on General Procurement of the Senate Committee on Armed Services is convened today to continue its hearing, which began last week, on the subject of Russian military procurement and expected trends in Russian weapons procurement during the 1980's.

As I indicated last week in my opening statement, the investigation by this subcommittee on Soviet military procurement is important both to provide information to assist the subcommittee in determining the proper level of military procurement in this country and to inform the Congress and public generally with respect to military weapons acquisition in Russia. At the first hearing, the subcommittee received significant testimony regarding estimates of Soviet military spending.

Mr. William T. Lee, an acknowledged expert with excellent sources of information, according to the Central Intelligence Agency testimony, testified that the Central Intelligence Agency could be underestimating Soviet military spending by as much as 100 percent. Witnesses from the Central Intelligence Agency, of course, disputed that view. All witnesses agreed, however, that Soviet military spending is far in excess of similar U.S. spending, especially in the area of military hardware procurement. This latter fact is of great importance to this country, and more particularly to the business of the Subcommittee on General Procurement.

Testimony last week also established the great disparity between the Soviet and United States share of the military budget spent on personnel. Sixty percent of the U.S. military-related spending goes to personnel and personnel-related costs. Mr. Lee indicated that including pensions, only 15 percent of military spending in Russia is

devoted to similar costs. I might say I had been under the impression that it was higher than that.

Although the Central Intelligence Agency agreed that 15 percent was accurate, a major discrepancy arose from Agency testimony that only 30 percent of U.S. military spending goes for personnel, despite the known fact that the percentage of U.S. personnel costs is almost 60 percent, or, in my judgment, even a little higher. I hope that we will be able to clear up that difference today.

The first witnesses today will be from the Defense Intelligence Agency. They are Dr. Jack Vorona, Deputy Director for Scientific and Technical Intelligence; Mr. Gordon Negus, Defense Intelligence Officer for Strategic Forces; and Mr. Ed Leavitt, economist. Thereafter the subcommittee will receive testimony from Dr. Steven Rosefielde, professor of economics, University of North Carolina. Dr. Rosefielde is a noted student of the Soviet economy and a recognized authority on Soviet military spending.

Finally, Donald Burton, Chief of the Military Economics Division, Office of Strategic Research, Central Intelligence Agency, will summarize the testimony of the Central Intelligence Agency and will, I understand, clarify the reasons for the wide disparity between the Agency figure and known facts for U.S. personnel costs.

If Mr. Negus and Dr. Vorona are here, would you please be seated at the witness table. I will remind all witnesses now that this hearing is in open session.

In the event any witness wishes to expand a question by supplementing it with classified information, such information could be given for the record and, with appropriate classification, or we could go into executive session.

Dr. Vorona, if you are ready, please proceed.

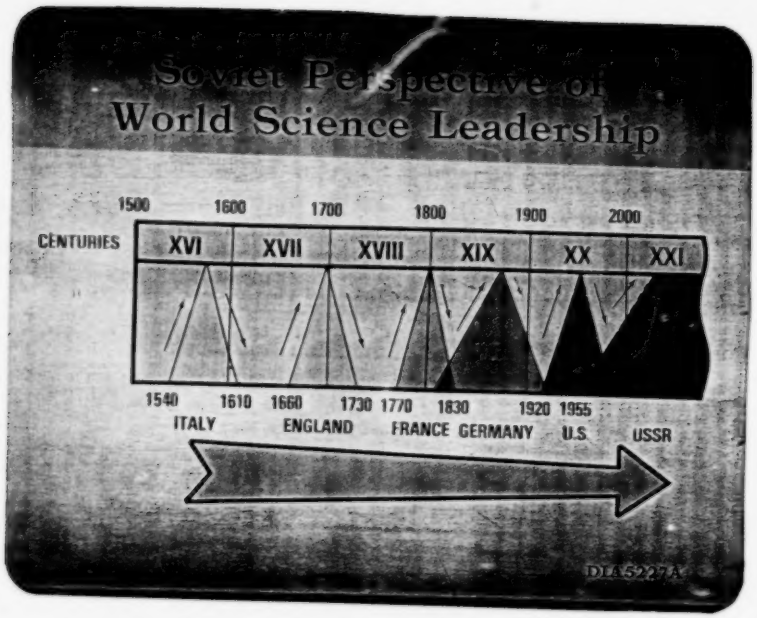
STATEMENT OF DR. JACK VORONA, DEPUTY DIRECTOR FOR SCIENTIFIC AND TECHNICAL INTELLIGENCE, DIA; ACCOMPANIED BY GORDON NEGUS, DIA OFFICER; ROBERT LEAVITT, ECONOMIST, DIA

Mr. VORONA. Thank you, Mr. Chairman.

It is a pleasure to appear before you this morning. I am going to discuss the weapons systems which the Soviets are acquiring with their defense rubles. I would also like to introduce Mr. Robert Leavitt, sitting at the table to my left.

Senator BYRD. We are delighted to have you here.

Mr. VORONA. Mr. Chairman, the illustration that you see appeared in a Soviet journal published in the 1960's. It shows the Soviet perspective of world science leadership—past, present, and future, and reflects their often stated goal of superiority in science and technology. My presentation today provides a brief status report on the Soviet progress toward this goal, its translation into military hardware during the past decade, and our prognosis for the next. I will also address the subject of technology transfer and its relationship to Soviet weapons system acquisition.



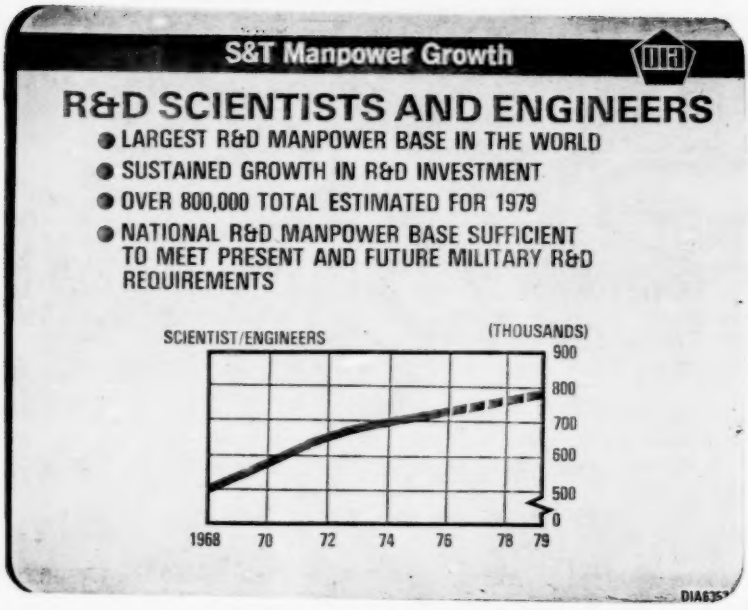
SOVIET TECHNOLOGICAL BASE

First I wish to characterize for us the Soviet technological base.

Present and near-term Soviet military capability reflects the achievements of a technological base that has grown steadily during the last decade. The high priority and military R. & D. sector received regular and large infusions of capital investment leading to significant growth in those research, design, and test facilities so critical to weapons development. For example, there has been roughly a 30-percent growth in aerospace facilities. A concurrent increase in the size of the Soviet R. & D. manpower force has also been noted. In 1979, this force was estimated at 800,000 scientists and engineers—the world's largest. In sheer numbers, the Soviets passed the United States in the mid-1960's.

Senator BYRD. Let me interrupt and ask you a point. You say in sheer numbers the Soviet R. & D. manpower force is the world's greatest. How about in quality?

Mr. VORONA. I will address that, sir. That is a more difficult question to answer but I will talk to that point. In addition, at least 270,000 new engineers are being graduated each year—a rather phenomenal number by U.S. standards. This is not to imply that the large Soviet R. & D. manpower force is totally committed to military R. & D., nor does it address factors such as productivity, quality, and utilization, which gets to your point, Mr. Chairman, but it does imply a large resource available to a sector that commands a high priority in resource allocation.



Indeed, we believe the best qualified of this important R. & D. manpower resource are earmarked for the defense sector. We believe this trend in facilities and manpower will continue through the next decade.

The Soviets have very obviously committed themselves to the creation of a technology base second to none. The remainder of this briefing will describe some of the resultant military capabilities.

STRATEGIC WEAPONS SYSTEMS

First, in strategic weapons systems, the Soviets have significantly improved their strategic missile capabilities over the past decade. They increased the number of intercontinental ballistic missile launchers from 1,050 in 1969 to about 1,400 in 1979, as is shown in this comparison chart. During this period, they developed and deployed four new ICBM systems with numerous payload variants.

They added flexibility to their force with the mobile SS–20 intermediate-range ballistic missile. During this past decade, they also developed multiple independently targetable reentry vehicles, for MIRV's for the ICBM's as well as the SS–20.

As a result of this force modernization and expansion, the Soviet improved the reliability, range, payload, and accuracy of their ballistic missiles. The improvements in payload and accuracy resulted in an improved hard target kill capability.

Further, the Soviets increased the survivability of their force by deploying missiles in silos with substantially greater structural hardness.

Quite independent of SALT II, we believe during the next decade the Russians will continue to improve the quality of their strategic land-based missile force—striving for higher reliability, faster response time, and even greater accuracy.

In the last 10 years, the Soviets introduced four classes of new ballistic missile submarines—SSBN's. They also reached the limit of 62 accountable SSBN's and 950 modern SLBM launchers allowed by the interim agreement of 1972 as shown here.

The Soviets now have over 30 operational Delta's. The Delta I's and II's are armed with the SS–N–8, a single warhead missile with a range of about 8,000 kilometers. The Soviets have begun to deploy the SS–N–18, a missile installed in the Delta III. This missile has a range of about 7,500 kilometers and a post-boost vehicle capable of dispensing MIRV's. As a result of these developments, the percentage of submarines whose missiles can hit the United States will rise significantly in the near future. Moreover, they are expected to introduce at least one new class during the coming decade whose ballistic missiles will probably feature improvements in yield, accuracy and range. We also see under development the SS–NX–17, a solid propellant missile with a presumed MIRV payload.

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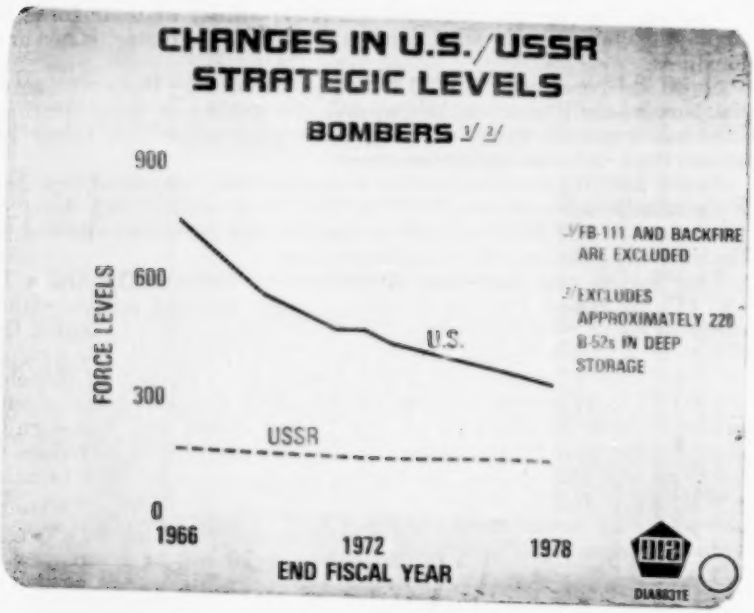
CHANGES IN U.S./USSR
STRATEGIC LEVELS
SLBMs
900
600
300
0
FORCE LEVELS
USSR
U.S.
1966
1972
1978
END FISCAL YEAR
DIA86-31E


CHANGES IN U.S./USSR
STRATEGIC LEVELS
BOMBERS 1/ 2/
900
600
300
0
FORCE LEVELS
U.S.
USSR
1966
1972
1978
END FISCAL YEAR
1/ FB-111 AND BACKFIRE ARE EXCLUDED
2/ EXCLUDES APPROXIMATELY 220 B-52s IN DEEP STORAGE
DIA86-31E

Throughout the past decade, the Soviets maintained their older heavy bomber strike force of some 140 TU–95 Bear and M-type Bison aircraft. In addition, some 40 Bison are now configured as tankers but could be reconfigured as bombers with little effort.

During this time, the Soviet Union developed and deployed a new bomber, Backfire, capable of both theater and intercontinental delivery. Staging from Arctic bases and refueled, the Backfire can cover virtually all targets in the United States and return to the Soviet Union.

Senator BYRD. May I interrupt you? What do you consider to be the range of the Backfire?

Mr. VORONA. Sir, I don't know if that is classified. May we supply those range and radius figures, sir, in writing?

Senator BYRD. Yes, sir.

[The information follows:]

Question. What do you consider to be the range of the Backfire?
Answer. [Deleted.]

Senator BYRD. You do consider it an intercontinental bomber?

Mr. VORONA. Yes, sir, we do.

On a one-way mission, it can deliver ordnance anywhere in Conus and recover in third countries without refueling. Approximately 150 of these versatile, multipurpose aircraft have been produced and are assigned to both Soviet Long Range and Naval Forces.

The Soviets are almost certainly in the process of developing a new long-range bomber to replace their aging Bear and Bison. This new bomber could appear in the early- to mid-1980's and can be expected to feature characteristics similar to the U.S. B–1. Introduction by the Soviets of a new cruise missile carrier in the decade of the 1980's must also be considered a very real possibility.

The Soviets are vigorously continuing to pursue developments of strategic air defense and ABM systems. They have, over the past 10 years, maintained their Moscow-based antiballistic missile system. This system, based largely on older technology, will require significant modifications and/or replacement to counter sophisticated threats. Needed developments would include discrimination radars capable of handling large numbers of targets and high performance interceptor missiles. There is every indication the Soviets are pursuing R. & D. supportive of these requirements.

For example, they are apparently developing a new ABM system—whether this system is designed for national deployment is not yet resolved. We would expect to see the Soviets continue ABM system development exploring the application of both conventional and nonconventional technologies.

In air defense, the Soviets, with their present interceptor and ground-based SAM systems, have a significant capability to defend against medium- and high-altitude penetrators.

During the past 10 years, the Soviets concentrated most of their efforts on force modernization—developing and deploying more capable radars and better data transmission systems so as to give Soviet commanders a near-real-time air situation display, a necessity for the control of their very numerous interceptor and SAM forces. A critical vulnerability, however, exists for them at low altitudes.

In the 1980's, therefore, we anticipate deployment of large numbers of look-down/shoot-down interceptors, the SA–X–10 low-altitude

SAM system, and extensive ground radar network and, quite possibly, AWAC-type aircraft. An effective defense against cruise missiles would, of course, represent a much more difficult problem requiring severe technological and deployment commitments. In view of past Soviet emphasis on the air defense of their homeland, we expect them to bend every effort in the years ahead to counter the air breathing threat.

TACTICAL WEAPON SYSTEMS

Let me turn to tactical weapon systems. A development pattern, similar to that for strategic systems—with equally impressive results—has been noted in the tactical weapons arena.

Although the achievements in the tactical ballistic missile area have not been as numerous as those in the strategic area, they have been significant. During this period, the 150-mile Scud and 500-mile Scaleboard short-range ballistic missile systems were replaced by or augmented with the newly developed SS–21 and SS–22 SRBM systems.

Tactical missile systems of the next decade will probably incorporate new technology to make them lighter and more mobile, more accurate, more responsive, and more lethal. We might expect to see new developments in land navigation systems and communications to speed targeting. The lower velocities for short-range missiles would make terminal homing systems more feasible than for ICBM's. Finally, the greater variety of targets for tactical missiles may well lead to the development of specialized conventional or nuclear warheads.

As you know the number of tactical missiles is not constrained by SALT treaties. Therefore, we may see increasing numbers of tactical missiles deployed as SALT-accountable ICBM's are diverted from peripheral targets.

NAVAL FORCES

In naval forces, impressive submarine production dominates Soviet naval accomplishments. In addition to the *Yankee* and *Delta* strategic submarine construction programs, the Soviets produced two versions of improved *Victor* class nuclear attack submarines (or SSN's) and converted some cruise missile and ballistic missile units to SSN's. Improved *Charlie* class nuclear cruise missile submarines (SSGN's) were introduced as well as the prototype for new class. Diesel-electric submarine production continued with the *Tango* class general purpose attack unit. In the next decade, overall submarine numbers may decline slightly as older units are phased out but the force will become proportionately more nuclear and military capable.

New classes of surface combatants during the past 10 years have included two air-capable ships, *Moskva* and *Kiev*, and guided-missile cruisers of the *Kresta II* and *Kara* classes. What could be the first of a class of nuclear-powered cruisers displacing over 20,000 tons is being fitted out in the Baltic. Conventionally and nuclear-powered major combatants will continue to be developed during the coming decade, possibly including an aircraft carrier.

Senator BYRD. How many aircraft carriers does Russia have operational now?

Mr. VORONA. Sir, if you include the multipurpose *Kiev* class, they have two but they are not aircraft carriers in the sense that we

would recognize them. These are *Kiev* class and *Moskva* and are both in the water right now and are operational.

Senator BYRD. So, the aircraft carrier is one area where the United States clearly has superiority over the Russians?

Mr. VORONA. Yes, sir, we believe the Russians are opting for their own bona fide aircraft carriers. This is what I allude to as what might appear in the 1980's.

Senator BYRD. In your prepared statement, you refer to "Russian construction of new conventional and nuclear powered cruisers and aircraft carriers." When will Russia deploy her first nuclear carrier, and how many nuclear carriers do you believe Russia will build during the 1980's?

Mr. VORONA. Sir, if I might, I would like to address that under separate cover.

[The information follows:]

There is considerable uncertainty concerning Soviet intentions for nuclear carrier development in the 1980's. [Deleted.]

Senator BYRD. Very well. I think that is an important question, but I will rely on your judgment as to its classification.

Mr. VORONA. The Soviet fleet is unlikely to grow in numbers beyond the present level of approximately 200 general purpose submarines, some 300 surface combatants, about 300 auxiliaries and replenishment ships, and around 100 amphibious warfare units. However, qualitative improvements in the force are anticipated with the introduction of modern and sophisticated weapons systems and sensors.

Platform construction will keep pace with technology and the Soviet Union will maintain its status as the world's largest producer of submarines and surface combatants for peacetime presence and wartime combat.

TACTICAL AIR

In tactical air, during the past 10 years the Soviets deployed three aircraft designed for ground-attack missions. These three aircraft, the Fencer A, Fitter D, and Flogger D, have increased radius capabilities, increased payloads, and the ability to deliver air-to-surface ordnance more accurately when compared to older Soviet fighters. In addition these aircraft may have ECM and ECCM equipment on board, to aid in penetrating defenses. The newer Soviet ground-attack aircraft employs a wide variety of air-to-surface weapons, including freefall and precision guided bombs, rockets, guns and tactical air-to-surface missiles. The Fencer A, Flogger D, and Fitter D are able to operate at night and in adverse weather; however, visual acquisition of the target is still required for their most effective operations.

During the next 10 years the Soviets are expected to improve the capability of their ground-attack aircraft to penetrate enemy defenses at low altitude and to improve the accuracy of their air-to-surface weapons. Improved navigation systems as well as more accurate bombing/navigation radars are expected to improve the all-weather capability of Soviet ground-attack aircraft. In addition the Soviets are expected to deploy precision guided munitions using laser or anti-radiation homing guidance.

During the past 10 years the Soviets deployed a wide variety of fighters that have an all-weather intercept capability. These aircraft

have a wide variety of armament including guns, infrared and semi-active radar guided missiles.

During the 1980's the Soviets are expected to continue developing and deploying new fighter aircraft.

Soviet fighters currently are not so totally defense oriented as they were in the 1950's and 1960's. Ground attack capabilities are being emphasized and it appears reasonable to expect significant improvements in this area during the 1980's to include new aircraft, new air-to-surface missiles, new armament, and more effective means of weapon delivery.

Air superiority however, can be expected to continue to receive priority attention during the 1980's. The Soviets may decide that current fighters, such as the Mig-21 (Fishbed) and Mig-23 (Flogger), are unable to effectively counter current and projected Western fighters. New Soviet air superiority fighters are therefore anticipated for the 1980's.

Since 1976 the Soviets deployed aircraft carriers with the YAK–36—(Forger)—vertical takeoff and landing aircraft aboard. The YAK–36 is a short-range, subsonic aircraft with limited payload capabilities. The Soviets undoubtedly have R. & D. under way to explore a next generation carrier aircraft with enhanced performance to include supersonic speeds, longer ranges, larger payloads and other launch and recovery techniques.

Helicopter development has also been very active during the past 10 years. The Hind, the first Soviet rotary wing aircraft designed as an attack helicopter, is deployed in large numbers. The Hip was modified to become the world's most heavily armed helicopter. Variants or new designs are expected in the future to upgrade the aging fleet of observation and utility helicopters. A new ship based ASW rotary wing aircraft is expected as well.

SOVIET TANK DEVELOPMENT

From World War II until the 1960's, the Soviets methodically developed and deployed a number of medium tanks including the T–34/85, T–44, T–54, T–55, and T–62. While the change from model to model was rather gradual, the combat capability of the T–62 was far superior to the older models. These significant strides were made with a minimum of technological risk. During the 1970's, the Soviets fielded two new tanks, the T–64, and T–72. While adherence to traditional design practices in these tanks is apparent, their significant improvements in firepower and protection place them in a family apart from previous Soviet tanks.

Senator BYRD. Dr. Vorona, would you summarize the tank program and indicate what new tanks, if any, they are working on.

Mr. VORONA. I really can't in this forum, Mr. Chairman, tell you what the new tank is going to look like. Our evidence on that is admittedly sketchy. I can also provide for you a lot more detail on the capabilities, armament, firepower, propulsion system, and protection for the T–64 and T–72 if you desire.

Senator BYRD. If you will, please submit that for the record, but in the interest of time could you summarize your Soviet tank description.

[The information follows:]

The T–64 medium tank was developed in the 1960's. The vehicle is currently used by some Soviet units in East Germany and inside the Soviet Union. The T–72 medium tank entered production in the early to mid-1970's. It is found in Soviet units only within the Soviet Union. A small number are found in Warsaw Pact nations. [Deleted.] An export version of the T–72 is currently being fielded in the Middle East and India. [Deleted.]

Characteristics for the T–64, T–72, and T–80 are given in the attached tables. [Deleted.]

[Tables deleted.]

Mr. VORONA. Yes, sir, I am finished with the tanks right now. If you wish I could go into artillery modernization.

SOVIET ARTILLERY MODERNIZATION

Soviet artillery modernization programs have resulted in the fielding of an impressive array of new equipment. This includes self-propelled 122-millimeter and 152-millimeter systems which are gradually augmenting and replacing towed weapons of similar caliber. These self-propelled systems provide improved mobility, increased crew protection and shorter response time. In addition, multiple rocket launcher systems of improved design, larger caliber, and greater range have been fielded. To match their improved artillery firepower, the Soviets also developed new target acquisition, observation, surveillance, and fire control equipment. Continued application of the self-propelled design principle to different cannon and rocket artillery can be expected in the 1980's. Additionally, ammunition improvements will be made to achieve greater range and lethality.

A new generation of Soviet antitank guided missiles was fielded during the past decade. The missiles feature semi-automatic guidance, provide increased armor penetration, improved hit probabilities and generally greater range capabilities than earlier systems. Mounting antitank missiles on helicopters also reached a more advanced state of development, particularly during the past 5 years. Future Soviet antitank missiles will emphasize armor penetration and will incorporate improved guidance with a fully automatic system being a major goal.

I have removed certain sections of the prepared statement in the interest of time. So you may have some difficulty following me. I am not including everything in the statement.

Senator BYRD. I think that is a good way to handle it, particularly in this section. I am especially anxious to get the Soviet technology development and technology transfer to the Soviet Union.

Mr. VORONA. All right, let me skip and go to the chemical warfare aspect before getting to technology. I do believe it is rather important.

The Soviet armed forces are considered to be the best equipped and trained forces for launching and sustaining chemical attacks. Their force posture and capabilities for survival and operations in a toxic environment are currently unequaled by any other forces.

Senator BYRD. What is the United States doing in that regard?

Mr. VORONA. Sir, I am really not qualified to answer that.

Senator BYRD. All right.

Mr. VORONA. A large quantity of specialized decontamination and reconnaissance vehicles are integrated throughout all service components of the Soviet forces. Soviet combat and combat support vehicles

are designed and equipped to operate in a contaminated environment. For example, the armored personnel carrier, the latest T-series tanks, mobile repair shops, and command and control vehicles are equipped with filtration systems capable of preventing toxic agents from entering the vehicles.

Soviet forces have available to them a large quantity and variety of chemical weapons and delivery system. The chemical agents available for employment include highly lethal nerve agents and the older type agents such as mustard and hydrogen cyanide. These agents can be delivered to forward targets by artillery, multiple rocket launchers, tactical rockets, and to deep targets by missiles and aerial bombs.

Now statements with respect to the Soviet technology developments——

Senator BYRD. My eye catches this statement, "The Soviet Armed Forces are considered to be the best equipped and trained forces for launching and sustaining chemical attacks." That seems to be a very significant statement to me. I judge from your testimony that the Soviets have placed considerable emphasis on chemical warfare, is that correct?

Mr. VORONA. Yes, sir, that is entirely correct. I suspect it stems in large measure from their experience in World War I when they suffered 475,000 gas casualties, 56,000 of which were fatal. I think they learned their lesson.

Senator BYRD. As I understand your testimony—and correct me if I am wrong—their program is not merely one of surviving in a chemical warfare environment, but one having an offensive capability in the chemical warfare field?

Mr. VORONA. Precisely.

Senator BYRD. Thank you.

SOVIET TECHNOLOGY DEVELOPMENTS

Mr. VORONA. Pacing each of the many new and improved Soviet weapon system developments is a very large research effort in the sciences and technologies. Technical advances in such fields as materials, propulsion, and electronics permitted the weapon system developments that we observed in the Soviet Union during the past 10 years. The introduction of yet improved military hardware will continue to depend on their success in advancing technological frontiers. Some high technology areas such as directed energy appear to have a significant potential for weapons application. For example, the U.S.S.R. appears to be roughly comparable to the United States in the capability to develop high energy laser systems. They have been working on the basic laser technologies as long as the United States, and apparently have the expertise, manpower, and resources to develop any type of weapon laser that the United States could.

Soviet awareness of the potential of electromagnetic pulse—EMP—weapons is indicated by articles in their open literature and they are actively pursuing development of the very high peak power microwave generators that would be relevant to such application.

Senator BYRD. Is Russia now building a prototype laser for intercept of ballistic missiles during boost phase?

Mr. VORONA. Sir, I would like to respond to that in a classified session.

Senator BYRD. Very well.
[The information follows:]

Is Russian building a prototype space laser antiballistic missile system? When will it be ready to be deployed? Could it have been deployed already?
[Deleted].

Mr. VORONA. Finally, the Soviets have been aware of and interested in particle beam weapon—PBW—concepts since the early 1950's. Within the U.S.S.R., there is considerable work in areas of technology relevant to PBW's. However, much of this technology has probably been developed for other applications. At this time, United States and Soviet accomplishments in the relevant technologies are roughly equivalent.

The foregoing discussion would be incomplete, however, without examining the relationship of technology transfer upon their military posture.

Senator BYRD. I don't like to interrupt but before we leave this topic, let me ask a question. You say, "For example, the U.S.S.R. appears to be roughly comparable to the United States in the capability to develop high energy laser systems." Information that we have received in the past indicates that at this point, the Soviets are considerably behind us in capability. But you are testifying that the Soviets are now roughly comparable to the United States in the capability to develop a high energy-laser system?

Mr. VORONA. Yes, sir.

Senator BYRD. Thank you.

TECHNOLOGY TRANSFER

Mr. VORONA. I would now like to talk to the issue of technology transfer and how it is being used by the Soviets to enhance their military posture. In addition to being the source of much of the Soviet Union's electronic and computer technology and manufacturing "know-how," the industrialized free world has, during this decade, supplied their industrial sector with billions of dollars worth of efficient machine tools, transfer lines, chemical plants, precision instrumentation, and associated technologies.

Senator BYRD. Can the transfer of technology such as that you mention be done without the approval of the Defense Department?

Mr. VORONA. Yes, sir and no, sir. Some things have been entirely legal, some things have happened quite covertly. In some cases——

Senator BYRD. Has the Defense Department approved the transfer of material that you speak of?

Mr. VORONA. In some cases, yes, sir. I suspect in other cases the DOD, the Defense Department has taken a negative view, but the decision to transfer has occurred.

Senator BYRD. But been overruled?

Mr. VORONA. Yes, sir.

Senator BYRD. Who would overrule the Defense Department in that regard?

Mr. VORONA. We are getting into areas beyond my ken, Mr. Chairman, but I believe it would probably be such entities as the Department of Commerce.

Senator BYRD. The Department of Commerce can overrule the Defense Department in matters of transfer of technology which can be used in a military way?

Mr. VORONA. Sir, I think I am getting on shaky ground in this arena. I think it is a community view which has to pertain in here. And DOD is but one of the voices. But I would prefer not to go further because I am really skating on thin ice in terms of my own personal knowledge.

Senator BYRD. It would seem to me to be a factual matter. Either the Commerce Department has the right or the authority to override DOD, or it doesn't.

Mr. VORONA. Yes, sir, and I really don't know.

Senator BYRD. All right. Proceed if you will.

Mr. VORONA. These goods and technologies have unquestionably played a major role in the modernization and expansion of Soviet industry. Unfortunately, "tracking" those acquisitions and proving that they have resulted in specific improvements in Soviet military capabilities is quite difficult inasmuch as equipment or technology must be acquired, assimilated, and placed into production. This can take years. In the process, it may be modified to fit the particular Soviet circumstance until it loses its original identity and becomes "Sovietized." The result is that the final product might be without any visible evidence of a Western contribution.

It is well known that the Soviets follow Western developments avidly through acquisition of scientific and technical journals, attendance at conferences and symposia, scientific exchange visits and the purchase of at least one copy of each of the 80,000 U.S. Government documents and Government contractor reports deposited with the National Technical Information Service of the Department of Commerce each year.

The actual improvements in Soviet military capabilities wrought by the acquisition of Western technology are often difficult to quantify. Nevertheless, we can cite some examples of Soviet acquisitions that we believe have made or are making a distinct contribution to the Soviet military procurement effort. In 1973 and 1974, 164 precision miniature ball-bearing grinding machines were delivered to the Soviet Union. There was concern that these machines enabled the Soviets to develop their MIRV capability. Actually, the first machines were not delivered until after the Soviets had begun testing their relatively unsophisticated first generation MIRV's. However, we have no doubt that these machines are making a distinctive contribution to the Soviet military effort and could very well be producing the precision miniature ball bearings used in current and follow-on high quality MIRV guidance systems.

Senator BYRD. If I interpret you correctly, American know-how is being utilized by Russia to develop its war machine. Is that an accurate statement?

Mr. VORONA. Very accurate. A very accurate statement. Yes, sir. An entire series of Soviet computers is based on IBM 360 and 370 computers that were illegally diverted into the U.S.S.R. in 1971 and 1972. These diversions via a free world firm may have been the cornerstone for the Soviet/Warsaw Pact development of the Ryad I and II computers.

While the United States is at the forefront of electronics manufacturing, we are but one of about 11 free world suppliers of metalworking and fabrication equipment. For example, an Austrian firm is the world's principal builder of precision rotary forging equipment, an

exceptionally efficient machine for producing high quality gun tubes. The Soviets have been one of the principal customers for these precision machines for almost two decades, purchasing probably hundreds of millions of dollars' worth of equipment. These machines can radically increase production rates while simultaneously producing a much higher quality barrel required for the greater rates of fire and higher muzzle velocity of today's weapons. As a result, the Soviets probably have the greatest gun-barrel manufacturing capacity in the world.

Senator BYRD. Say that again, please.

Mr. VORONA. As a result, the Soviets probably have the greatest gun-barrel manufacturing capability in the world today.

In addition to the examples cited above, we see the Soviets making a concerned effort to gain as much information, technology, and equipment as possible on new and emerging technologies which may not have reached the military application phase in the United States but which certainly have the potential for such use.

Under the auspices of an agreement between the United States and Hungarian Academies of Science, one Gyorgy Zimmer, who heads the Hungarian effort in magnetic bubble research, has been coming to the United States periodically and conducting research at one of our leading universities, attending conferences, and visiting other facilities to observe and discuss American research. As in all other fields, we believe the Soviets have access to most, if not all, Hungarian and other Warsaw Pact research and information including that which Mr. Zimmer gains in the United States. I would be surprised if this were not the case—indeed, foreign visitors tend to confirm this fact.

Senator BYRD. Does that mean Mr. Zimmer has access to classified information of the Defense Department?

Mr. VORONA. No, sir; I wouldn't characterize it that way because these technologies, such as magnetic bubbles for memories in computers, haven't really reached the weapons application and therefore the classified status.

Senator BYRD. To put it another way, he has had access to all commercial technology that the U.S. Government and its companies have published on that topic.

Mr. VORONA. He has had access to state of the art technology which very well may have military application, but certainly not to all of the technology that is commercially available.

Senator BYRD. Thank you.

Mr. VORONA. I will talk briefly to the student exchange program. This is another very effective transfer mechanism and derives from the student exchange program that exists between the United States and the U.S.S.R./Warsaw Pact and China.

Senator BYRD. When did that program begin?

Mr. VORONA. Some time during the 1970's, sir, early to mid-1970's is my recollection. The Soviet exchange students had come to the United States for an academic year, and they usually already possess the equivalent of a Ph. D. degree, average about 35 years of age, and probably have about 8 years of practical experience.

Examples of topics the Soviet students will study are shown on this vugraph. You can see the sciences that they are involved in.

Senator BYRD. What government department has jurisdiction over that program?

Mr. VORONA. Well, sir, this particular program is under the jurisdiction of an organization known as IREX, International Research and Exchange.

Senator BYRD. What does that come under?

Mr. VORONA. I don't know if there is any formal connection with the U.S. Government or not. If there is, it is probably tenuous. I think it pretty much an informal, nongovernment exchange mechanism whereby the United States will send certain numbers of students over to the Soviet Union——

Senator BYRD. When you speak of the United States, you are not speaking of the U.S. Government?

Mr. VORONA. No, sir. I am talking about a nongovernment organization which sets up this exchange, but which is partially government funded.

Senator BYRD. From your vantage point in the Department of Defense, would this be detrimental to the United States?

Mr. VORONA. I think it has been; yes, sir. I think the United States has not taken advantage of the opportunities which it might if it were to study the same kinds of things that you can see up there the Soviets are studying.

Senator BYRD. What about in reverse?

Mr. VORONA. One of those topics, as you can see on the vugraph, is passage of shock waves through the inert and combustible heterogeneous mixtures. That is an interesting one because the Soviet scientist who studied that in the United States, we have reason to believe, is involved in the Soviet Union with the development of fuel/air explosives, and that is one of the sciences involved in the development of fuel/air explosives.

Senator BYRD. When the Soviet scientists come to this country, do they have free access to information; can they travel freely or are they circumscribed in any way?

Mr. VORONA. I think the Soviets are circumscribed in certain ways; yes, sir. Those that are not are the pact nations. Those people have tremendous freedom of access within the country and to organizations, much more so than the Soviets.

Senator BYRD. While well intentioned, has this tended to work to the disadvantage of the United States in the field of defense?

Mr. VORONA. Yes, sir, that is my firm conclusion.

This vugraph and the things studied by the Soviet students is contrasted with typical examples that American students study, as shown on the next vugraph. Here you can see such things as:

Language and style in the Chet'i Minei of Dmitri Rostovsky.

Socio-Economic developments of formal organization in Vilnius.

The professionalization of Russian psychiatry 1860–1911.

Marriage patterns in Russia and the U.S.S.R. 1897–1975.

And so on. The Soviets study the hard sciences and engineering. They know exactly what they want and where to go to get it.

In summary, the Soviets are seeking Western technology and equipment by any and all means. In the past, Soviet weapon designers appeared to be somewhat constrained in the effectiveness of the products they could develop by a limited technological base for specialized

components. Technology transfer affords them the opportunity to rectify such deficiencies.

Much of what they acquire is slated for the industrial sector, but that this equipment and technology has been, and is, important to the Soviet military is axiomatic. As I have indicated, the audit trail for Western equipment, science, and technology is sometimes difficult to follow and its effects even harder to quantify, but we are positive it is there and making a very significant contribution.

It was my intention that this presentation convey to you the intensity, the momentum, the continuity, the seriousness, and the profusion of Soviet military systems acquisition. The huge research base which I earlier described is now planting the seeds for even more sophisticated weapons of the 1990's. Recall the first vugraph which showed the Soviet prediction of their technical leadership commencing in the late 20th century. By whatever yardstick one applies, they are clearly intent upon fulfilling that prophecy.

Mr. Chairman, that concludes my prepared text.

Senator BYRD. Thank you, Dr. Vorona. You have made a very illuminating statement. In your statement you say, "The Soviets are seeking Western technology and equipment by any and all means." And you stated that use of Western technology has been very helpful to the Russians in developing their military potential, if I understood you correctly.

Mr. VORONA. Yes, sir; that is our assessment.

Senator BYRD. Before we leave the question of the exchange students, are American exchange students permitted to go to the Soviet Union to study hard sciences? I know they are permitted to study history and things like humanities, but how about hard sciences?

Mr. VORONA. I don't think, Mr. Chairman, that has really been put to the test. I don't know how many Americans have applied to study in the fields where the Soviets really are preeminent, such as the various facets of higher mathematics or radio wave propogation or high energy lasers or high pressure physics, et cetera.

It would be an interesting test case.

Senator BYRD. If you can obtain additional information, you might provide it for the record.

[The information follows:]

DIA does not maintain data on the U.S. students. According to information published by the International Research and Exchanges Board (which administers this student exchange) only seven American students have studied in the Soviet Union in the Graduate Student/Young Faculty exchange program in the area of hard sciences during academic year 76–77, 77–78, 78–79. However, none of these students studied in any area of science that had any military applications. (Hard sciences as used here includes the natural and life sciences.)

Senator BYRD. Now I might say at this point that your complete statement will be published in the record.

[The prepared statement of Dr. Jack Vorona, follows:]

PREPARED STATEMENT OF DR. JACK VORONA, ASSISTANT VICE DIRECTOR FOR SCIENTIFIC AND TECHNICAL INTELLIGENCE

INTRODUCTION

This illustration appeared in a Soviet journal published in the 1960s. It shows the Soviet perspective of world science leadership—past, present and future, and reflects their often stated goal of superiority in science and technology. My pres-

entation today provides a brief status report on the Soviet progress toward his goal; its translation into military hardware during the past decade and our prognosis for the next. I will also address the subject of technology transfer and its relationship to Soviet weapons system acquisition.

THE SOVIET TECHNOLOGICAL BASE

The present and near term Soviet military capability reflects the achievements of a technological base that has grown steadily during the last decade. The high priority military R. & D. sector received regular and large infusions of capital investment leading to significant growth in those research, design and test facilities so critical to weapons development. For example, there has been roughly a 30 percent growth in aerospace facilities.

A concurrent increase in the size of the Soviet R. & D. manpower force has also been noted. In 1979, this force was estimated at 800,000 scientists and engineers—the world's largest. In sheer numbers, the Soviets passed the United States in the mid-1960's. In addition, at least 270,000 new engineers are being graduated each year—a rather phenomental number by U.S. standards. This is not to imply that the large Soviet R. & D. manpower force is totally committed to military R. & D., nor does it address factors such as productivity, quality and utilization—but it does imply a large resource available to a sector that commands a high priority in resource allocation. Indeed, we believe the best qualified of this important R. & D. manpower resource are earmarked for the defense sector. We believe this trend in facilities and manpower will continue through the next decade.

The Soviets have very obviously committed themselves to the creation of a technology base second to none. The remainder of this briefing will describe some of the resultant military capabilities.

STRATEGIC WEAPONS SYSTEMS

The Soviets have significantly improved their strategic missile capabilities over the past decade. They increased the number of intercontinental ballistic missile launchers from 1050 in 1969 to about 1400 in 1979, as is shown in this comparison chart. During this period, they developed and deployed four new ICBM systems with numerous payload variants.

They added flexibility to their force with the mobile SS–20 intermediate-range ballistic missile. During this past decade, they also developed multiple independently targetable reentry vehicles, or MIRV's for the ICBM's as well as the SS–20.

As a result of this force modernization and expansion, the Soviets improved the reliability, range, payload, and accuracy of their ballistic missiles. The improvements in payload and accuracy resulted in an improved hard target kill capability.

Further, the Soviets increased the survivability of their force by deploying missiles in silos with substantially greater structural hardness.

Quite independent of SALT, we believe during the next decade the Russians will continue to improve the quality of their strategic land based missile force—striving for higher reliability, faster response time and even greater accuracy.

In the last 10 years, the Soviets introduced four classes of new ballistic missile submarines (SSBN's). They also reached the limit of 62 accountable SSBN's and 950 modern SLBM launchers allowed by the interim agreement of 1972 as shown here.

Although only a small portion of the Soviet SSBN force is maintained on operational patrol, the long-range missiles of the Delta class SSBN's can reach the United States while still in Soviet ports. The Soviets now have over 30 operational Delta's. The Delta I's and II's are armed with the SS–N–8, a single warhead missile with a range of about 8000 kilometers. The Soviets have begun to deploy the SS–N–18, a missile installed in the Delta III. This missile has a range of about 7500 kilometers and a post-boost vehicle capable of dispensing MIRV's. As a result of these developments, the percentage of submarines whose missiles can hit the U.S. will rise significantly in their near future. Moreover, they are expected to introduce at least one new class during the coming decade whose ballistic missiles will probably feature improvements in yield, accuracy and range. We also see under development the SS–NX–17, a solid propellant missile with a presumed MIRV payload.

Throughout the past decade the Soviets maintained their older heavy bomber strike force of some 140 TU–95 Bear and M-type Bison aircraft. In addition, some 40 Bison are now configured as tankers but could be reconfigured as bombers with little effort.

During this time, the Soviet Union developed and deployed a new bomber (Backfire) capable of both theater and intercontinental delivery. Staging from Arctic bases and refueled the Backfire can cover virtually all targets in the U.S. and return to the Soviet Union. On a one-way mission, it can deliver ordnance anywhere in Conus and recover in third countries without refueling. Approximately 150 of these versatile, multi-purpose aircraft have been produced and are assigned to both Soviet Long-Range and Naval Forces.

The Bison tankers are able to refuel Bear, Bison, and Backfire bombers. The Soviets may develop a new tanker using the IL–76 Candid jet transport as an airframe, and/or convert the remaining Bison bombers to tankers.

The Soviets are almost certainly in the process of developing a new long-range bomber to replace their aging Bear and Bison's. This new bomber could appear in the early- to mid-1980's and can be expected to feature characteristics similar to the U.S. B–1. Introduction by the Soviets of a new cruise missile carrier in the decade of the 1980's must also be considered a very real possibility.

The Soviets are vigorously continuing to pursue developments of strategic air defense and ABM systems. They have, over the past 10 years, maintained their Moscow-based antiballistic missile system. This system, based largely on older technology, will require significant modifications and/or replacement to counter sophisticated threats. Needed developments would include discrimination radars capable of handling large numbers of targets and high performance interceptor missiles. There is every indication the Soviets are pursuing R&D supportive of these requirements.

For example, they are apparently developing a new ABM system—whether this system is designed for national deployment is not yet resolved. We would expect to see the Soviets continue ABM system development exploring the application of both conventional and unconventional technologies.

In air defense, the Soviets, with their present interceptor and ground based SAM systems, have a significant capability to defend against medium and high altitude penetrators.

During the past 10 years, the Soviets concentrated most of their efforts on force modernization—developing and deploying more capable radars and better data transmission systems so as to give Soviet commanders a near-real-time air situation display, a necessity for the control of his very numerous interceptor and SAM forces. A critical vulnerability, however, exists at low altitudes. In the 1980's, therefore, we anticipate deployment of large numbers of look-down/shoot-down interceptors, the SA–X–10 low altitude SAM system, and extensive ground radar network and, quite possibly, AWAC type aircraft. An effective defense against cruise missiles would of course, represent a much more difficult problem requiring severe technological and deployment commitments. In view of past Soviet emphasis on the air defense of their homeland, we expect them to bend every effort in the years ahead to counter the air breathing threat.

Starting from the launch of Sputnik 1 in 1957, the Soviet space program developed into an expansive program encompassing all generic mission areas one would expect a super power to exploit. With well over 75 space launches in each of the last 10 years, their space program is one of extreme diversity ranging from the orbital interceptor to the purely scientific and exploratory—the lunar and planetary program. However, it is dominantly military in character. They are gradually expanding civilian applications, but these are overshadowed numerically by the military space program which includes the aforementioned orbital interceptor, communications, meteorological, naval support, and reconnaissance and surveillance satellite systems.

The high Soviet launch rate is expected to continue for the next several years and their space program will continue to produce steady gains in reliability, sophistication, and operational capability.

TACTICAL WEAPONS SYSTEMS

A development pattern, similar to that for strategic systems—with equally impressive results—has been noted in the tactical weapons arena.

Although the achievements in the tactical ballistic missile area have not been as numerous as those in the strategic area, they have been significant. During

this period, the 150-mile Scud and 500-mile Scaleboard short-range ballistic missile systems were replaced by or augmented with the newly developed SS–21 and SS–22 SRBM systems.

Tactical missile systems of the next decade will probably incorporate new technology to make them lighter and more mobile, more accurate, more responsive, and more lethal. We might expect to see new developments in land navigation systems and communications to speed targeting. The lower velocities for short-range missiles would make terminal homing systems more feasible than for ICBM's. Finally, the greater variety of targets for tactical missiles may well lead to the development of specialized conventional or nuclear warheads.

As you know, the number of tactical missiles is not constrained by SALT Treaties. Therefore, we may see increasing numbers of tactical missiles deployed as SALT-accountable ICBMs are diverted from peripheral targets.

NAVAL FORCES

Impressive submarine production dominates Soviet naval accomplishments. In addition to the Yankee and Delta strategic submarine construction programs, the Soviets produced two versions of improved Victor Class nuclear attack submarines (or SSN's) and converted some cruise missile and ballistic missile units to SSNs. Improved Charlie Class nuclear cruise missile submarines (SSGN's) were introduced as well as the prototype for new class. Diesel-electric submarine production continued with the Tango Class general purpose attack unit. In the next decade, overall submarine numbers may decline slightly as older units are phased out but the force will become proportionately more nuclear and militarily capable.

New classes of surface combatants during the past 10 years have included two air-capable ships, *Moskva* and *Kiev*, and guid d-missile cruisers of the *Kresta II* and *Kara* Classes. What could be the first of a class of nuclear-powered cruisers displacing over 20,000 tons is being fitted out in the Baltic. Conventionally and nuclear powered major combatants will continue to be developed during the coming decade, possibly including an aircraft carrier. The Soviet Fleet is unlikely to grow in numbers beyond the present level of approximately 200 general purpose submarines, some 300 surface combatants, about 300 auxiliaries and replenishment ships, and around 100 amphibious warfare units. However, qualitative improvements in the Force are anticipated with the introduction of modern and sophisticated weapons systems and sensors. Platform construction will keep pace with technology and the Soviet Union will maintain its status as the world's largest producer of submarines and surface combatants for peacetime presence and wartime combat.

The Soviets are continuing evolutionary improvements in their ASW (anti-submarine warfare) capabilities against both strategic and general purpose forces. Most combatants have some ASW capability and the trend is expected to continue. Although major ships, submarines and combat aircraft of the Soviet Navy include in their missions defense against Western aircraft carriers and interdiction of major shipping lanes, we estimate that the Soviets give the highest naval priority to ASW against ballistic missile submarines.

In summary, the Soviets will continue to improve their capabilities to conduct distant operations with the introduction of new and sophisticated platforms and weapons systems. However, revolutionary improvements in capabilities or force levels are not anticipated, despite their thorough understanding of the applicable technologies.

TACTICAL AIR

During the past 10 years the Soviets deployed three aircraft designed for ground-attack missions. These three aircraft, the Fencer A, Fitter D, and Flogger D, have increased radius capabilities, increased payloads, and the ability to deliver air-to-ground ordnance more accurately when compared to older Soviet fighters. In addition these aircraft may have ECM and ECCM equipment onboard, to aid in penetrating defenses. The newer Soviet ground-attack aircraft employ a wide variety of air-to-ground weapons including free-fall and precision guided bombs, rockets, guns and tactical air-to-surface missiles. The Fencer A, Flogger D, and Fitter D are able to operate at night and in adverse weather; however, visual acquisition of the target is sti'l required for most effective operations.

During the next 10 years the Soviets are expected to improve the capability of their ground-attack aircraft to penetrate enemy defenses at low altitude and to

improve the accuracy of their air-to-surface weapons. Improved navigation systems as well as more accurate bombing/navigation radars are expected to improve the all-weather capability of Soviet ground-attack aircraft. In addition the Soviets are expected to deploy precision guided munitions using laser or anti-radiation homing guidance.

During the past 10 years the Soviets deployed a wide variety of fighters that have an all-weather intercept capability. These aircraft have a wide variety armament including guns, infrared and semiactive radar guided missiles.

During the 1980's the Soviets are expected to continue developing and deploying new fighter aircraft.

Soviet fighters currently are not so totally defense oriented as they were in the 1950's and 1960's. Ground attack capabilities are being emphasized and it appears reasonable to expect significant improvements in this area during the 1980's to include new aircraft, new air-to-surface missiles, new armament and more effective means of weapon delivery.

Air superiority however, can be expected to continue to receive priority attention during the 1980s. The Soviets may decide that current fighters, such as the MiG–21 (Fishbed) and MiG–23 (Flogger), are unable to effectively counter current and projected Western fighters. New Soviet air superiority fighters are anticipated for the 1980's.

Since 1976 the Soviets deployed aircraft carriers with the Yak–36 (Forger) vertical takeoff and landing aircraft aboard. The Yak–36 is a short-range, subsonic aircraft with limited payload capabilities. The Soviets undoubtedly have R. & D. underway to explore a next generation carrier aircraft with enhanced performance to include supersonic speeds, longer ranges, larger payloads and other launch and recovery techniques.

Helicopter development has also been very active during the past 10 years. The Hind, the first Soviet rotary wing aircraft designed as an attack helicopter, is deployed in large numbers. The Hip was modified to become the world's most heavily armed helicopter. Variants or new designs are expected in the future to upgrade the aging fleet of observation and utility helicopters. A new ship based ASW rotary wing aircraft is expected as well.

SOVIET TANK DEVELOPMENT

From World War II until the 1960s, the Soviets methodically developed and deployed a number of medium tanks including the T–34/85, T–44, T–54, T–55, and T–62. While the change from model to model was rather gradual, the combat capability of the T–26 was far superior to the older models. These significant strides were made with a minimum of technological risk. During the 1970s, the Soviets fielded two new tanks, the T–64 and T–72. While adherence to traditional design practices in these tanks are apparent, their significant improvements in firepower and protection place them in a family apart from previous Soviet tanks. In keeping with tradition, we expect that the T–64 and T–72 will serve as the basis for follow-on development which we should see in the form of a new follow-on medium tank.

Soviet artillery modernization programs have resulted in the fielding of an impressive array of new equipment. This includes self-propelled 122-mm and 152-mm systems which are gradually augmenting and replacing towed weapons of similar caliber. These self-propelled systems provide improved mobility, increased crew protection and shorter response time. In addition, multiple rocket launcher systems of improved design, larger caliber, and greater range have been fielded. To match their improved artillery firepower, the Soviets also developed new target acquisition, observation, surveillance, and fire control equipment. Continued application of the self-propelled design principle to different cannon and rocket artillery can be expected in the 1980s. Additionally, ammunition improvements will be made to achieve greater range and lethality.

Soviet infantry weapons have continued to undergo improvement during the 1970's. The RPG–7 antitank grenade launcher is still held in large quantities but a new version, the RPG–16, provides greater range and lethality. A new family of small arms firing 5.45-mm ammunition is now making its appearance. The Soviet development of this cartridge follows the Western trend to smaller caliber military rounds that started in the 1950s and resulted in the widely-used U.S. 5.56-mm cartridge. The AK–74 assault rifle which fires this new

Soviet ammunition is similar in basic design to the older AKM, a weapon that has been widely distributed not only to Soviet forces but to many countries throughout the world. Improvements in infantry weapons during the 1980's will be directed at incorporating evolutionary design changes in weapons and ammunition and the gradual replacement of older weapons with the more modern systems.

A new generation of Soviet antitank guided missiles was fielded during the past decade. The missiles feature semiautomatic guidance, provide increased armor penetration, improved hit probabilities and generally greater range capabilities than earlier systems. Mounting antitank missiles on helicopters also reached a more advanced state of development, particularly during the past 5 years. Future Soviet antitank missiles will emphasize armor penetration and will incorporate improved guidance with a fully automatic system being a major goal.

During the last 10 years the Soviets continued to improve the mobility, firepower and target handling capability of their ground forces' air defense umbrella. They have added two new tactical surface-to-air missile systems to the three which were already deployed in 1969. These five systems complement each other in range and altitude capabilities thereby providing a formidable air defense shield for their ground forces. The trend of improving air defense coverage is expected to continue through the modification of existing systems and the introducion of new systems to supplement or replace them.

The Soviet armed forces are considered to be the best equipped and trained forces for launching and sustaining chemcial attacks. Their force posture and capabilities for survival and operations in a toxic environment are currently unequaled by any other forces.

A large quantity of specialized decontamination and reconnaissance vehicles are integrated throughout all service components of the Soviet forces. Soviet combat and combat support vehicles are designed and equipped to operate in a contaminated environment. For example, the armored personnel vehicle, the latest T-series tanks, mobile repair shops and command and control vehicles are equipped with filtration systems capable of preventing toxic agents from entering the vehicles.

Soviet forces have available to them a large quantity and variety of chemical weapons and delivery systems. The chemical agents available for employment include highly lethal nerve agents and the older type agents such as mustard and hydrogen cyanide. These agents can be deliveresd to forward targets by artillery, multiple rocket launchers, tactical rockets, and to deep targets by missiles and aerial bombs.

As an indication of the importance that the Soviets place on chemical warfare, the chemical troop organization has been expanded in recent years and chemical specialists have been integrated into all force levels. In some units, platoons have been upgraded to companies, companies have become battallions, and battalions, regiments.

SOVIET TECHNOLOGY DEVELOPMENTS

Pacing each of the many new and improved Soviet weapon system developments is a very large research effort in the sciences and technologies. Technical advances in such fields as materials, propulsion and electronics permitted the weapon system developments that we observed in the Soviet Union during the past 10 years. The introduction of yet improved military hardware will continue to depend on their success in advancing technological frontiers. Some high technology areas such as directed energy appear to have a significant potential for weapons application. For example, the U.S.S.R. appears to be roughly comparable to the U.S. in the capability to develop high energy laser systems. They have been working on the basic laser technologies as long as the United States, and apparently have the expertise, manpower, and resources to develop any type of weapon laser than the United States could.

Soviet awareness of the potential of electromagnetic pulse (EMP) weapons is indicated by articles in their open literature and they are actively pursuing development of the very high peak power microwave generators that would be relevant to such application.

Finally, the Soviets have been aware of and interested in particle beam weapon (PBW) concepts since the early 1950's. Within the U.S.S.R., there is considerable work in areas of technology relevant to PBW's. However, much of this tech-

nology has probably been developed for other applications. At this time, United States and Soviet accomplishments in the relevant technologies are roughly equivalent.

TECHNOLOGY TRANSFER

The foregoing discussion would be incomplete however, without examining the relationship of technology transfer upon their military posture.

In addition to being the source of much of the Soviet Union's electronic and computer technology and manufacturing "know-how," the industrialized Free World has, during this decade, supplied their industrial sector with billions of dollars worth of efficient machine tools, transfer lines, chemical plants, precision instrumentation, and associated technologies. These goods and technologies have unquestionably played a major role in the modernization and expansion of Soviet industry. Although much of the technology embodied in the Western equipment is known and understood by Soviet technicians, their purchase via long term low interest loans has enabled the Soviet Union (and other Warsaw Pact countries) to achieve an industrial expansion at a substantially faster rate than would have been possible with indigenous resources. Unfortunately, "tracking" those acquisitions and proving that they have resulted in specific improvements in Soviet military capabilities is quite difficult inasmuch as equpment or technology must be acquired, assimilated and placed into production. This can take years. In the process, it may be modified to fit the particular Soviet circumstance until it loses its original identity and becomes "Sovietized." The result is that the final product might be without any visible evidence of a Western contribution.

It is well known that the Soviets follow Western developments avidly through acquisition of scientific and technical journals, attendance at conferences and symposia, scientific exchange visits and the purchase of at least one copy of each of the 80,000 U.S. government documents and government contractor reports deposited with the National Technical Information Service of the Department of Commerce each year.

The actual improvements in Soviet military capabilities wrought by the acquisition of Western technology are often difficult to quantify. For example: truck tires possessing one-third greater wear because of superior carbon black from a Western-built plant or long range transport aircraft that suffer less down time due to the use of engine components produced on Western manufacturing equipment.

Nevertheless, we can cite some examples of Soviet acquisitions that we believe have made or are making a distinct contribution to the Soviet military procurement effort. In 1973 and 1974, 164 precision miniature ball bearing grinding machines were delivered to the Soviet Union. There was concern that these machines enabled the Soviets to develop their MIRV capability. Actually, the first machines were not delivered until after the Soviets had begun testing their relatively unsophisticated first generation MIRVs. However, we have no doubt that these machines are making a distinctive contribution to the Soviet military effort and could very well be producing the precision miniature ball bearings used in current and follow-on high quality MIRV guidance systems.

Another such example is in the production of Soviet Kamaz trucks. The Kama River truck plant located near the city of Neberezhnyye Chelny in the USSR was built almost exclusively with Western technology. Among other things, the U.S. supplied the automated foundry for making the engines, the production line and the computer that controls the plant. The plant, when it reaches full production, will produce 150,000 trucks and an additional 100,000 engines per year. These trucks are more efficient and reliable than those they are replacing and have a 60 percent greater haul capability on a one-for-one basis. Many of these trucks indeed are going into the civil economy, (where they are always subject to call by the military); but others are actually being used by the military. We continue to receive unconfirmed reports that some of the excess engines may be destined for other military vehicles.

An entire series of Soviet computers is based on IBM 360 and 370 computers that were illegally diverted into the USSR in 1971 and 1972. These diversions via a Free World firm may have been the cornerstone for the Soviet/Warsaw Pact development of RYAD I and II computers. The number of known cases of COCOM embargoed computers that have been diverted into the Soviet Union may be just the tip of the iceberg.

While the United States is at the forefront of electronics manufacturing, we are but one of about 11 Free World suppliers of metal working and fabrication

equipment. For example, an Austrian firm is the world's principal builder of precision rotary forging equipment—an exceptionally efficient machine for producing high quality gun tubes. No other type of machine in the world is competitive with these machines. The Soviets have been one of the principal customers for these precision machines for almost two decades, purchasing probably hundreds of millions of dollars worth of equipment. These machines can radically increase production rates while simultaneously producing a much higher quality barrel required for the greater rates of fire and higher muzzle velocity of today's weapons. In addition, with today's higher quality steel, the overall life of artillery weapon systems is increased. As a result, the Soviets probably have the greatest gun-barrel manufacturing capability in the world.

Soviet acquistions are not limited to purchases and diversions of equipment and goods. Soviet scientists and engineers study Western scientific developments and acquire technology know-how. I'll have more to say on this later but one specific example with direct military application that highlights the problem is that of a Soviet exchange student who came to the United States in the academic year 1976–77. He studied at one of our leading universities in the science involved in fuel-air explosives. It appears this Soviet "student" is himself involved in research directly related to fuel-air explosives.

In addition to the examples cited above we see the Soviets making a concerted effort to gain as much information, technology and equipment as possible on new and emerging technologies which may not have reached the military application phase in the United States but which certainly have the potential for such use.

Some examples are magnetic bubble memory technology for computers, genetic engineering (but more specifically the recombinant DNA (deoxyribonucleic acid), fracture mechanics and superplasticity. To be more explicit, under the auspices of an agreement between the United States and Hungarian Academies of Science, one Gyorgy Zimmer, who heads the Hungarian effort in magnetic bubble research, has been coming to the United States periodically and conducting research at one of our leading universities, attending conferences and visiting other facilities to observe and discuss American research. As in all other fields, we believe the Soviets have access to most if not all Hungarian and other Warsaw Pact research and information including that which Mr. Zimmer gains in the United States. I would be surprise if this were not the case—indeed, foreign visitors tend to confirm this fact.

BILATERAL AGREEMENTS

In addition to the acquisition of Western industrial plants and equipment, the decade of the 70's has also witnessed greatly expanded contact between the Free World and Soviet scientists and engineers. The scope and depth of Soviet interest in the advanced and emerging technologies is exemplified by the exchange agreements the Soviets have negotiated with the United States since 1972. There are 10 bilateral agreements in existence with the United States comprising about 240 or so working groups in which Soviet and U.S. personnel are jointly working, including such subtopics as use of computers, metallurgy, microbiology, chemical catalysis, physics, science policy, metrology, earthquake prediction, fast breeder reactors, controlled thermonuclear research and MHD power generation. One of the provisions common to many of these bilateral agreements encourages the establishment of separate agreements between individual U.S. companies and entities of the Soviet government such as the State Committee for Science and Technology. The Soviet Union has negotiated such agreements with a large number of U.S. companies; significantly, we believe, with companies who are "front-runners" in areas in which the Soviets are deficient. There is no formal U.S. government oversight of these agreements unless the accord results in the sale or transfer of an item or technical data that requires a validated export license. We view these agreements as still another mechanism for the potential transfer of advanced technology.

STUDENT EXCHANGE PROGRAM

Additional bilateral agreements that we believe serve as a very effective transfer mechanism are those that provide for the student exchange program that exists between the United States and the U.S.S.R./Warsaw Pact/China. The Soviet exchange students that come to the United States for an academic year usually already possess the equivalent of a United States Ph. D. degree, average about 35 years of age, and probably have about 8 years of practical experience. Examples of topics the Soviet students study are:

Research in Digital Automatic Control and Diagnosis.
Ferroelectric Ceramics.
Technological possibilities and efficiency of Computer application for control of machine-tool systems with digital set control.
Passage of shock waves through inert and combustible heterogeneous mixtures.
Conversion of hydraulic signals into electrical signals.
Photoelectric phenomena in semiconductors.
Solid state electrochemical thermodynamics.
This is contrasted with typical examples that American students study:
Language and style in the Chet'i Minei of Dmitri Rostovsky.
Socio-Economic developments of formal organization in Vilnius.
The professionalization of Russion psychiatry 1860–1911.
Marriage patterns in Russia and the U.S.S.R. 1897–1975.
The state and the economy in Catherinian Russia.
Soviet criminal law and codification.
The development of medical sciences in 19th century Russia.

This disparity is further highlighted in this slide. It can be seen that U.S. students study language, history, social science, and art, while the Soviets study the hard sciences and engineering.

In summary, the Soviets are seeking Western technology and equipment by any and all means. In the past, Soviet weapon designers appeared to be somewhat constrained in the effectiveness of the products they could develop by a limited technological base for specialized components. Technology transfer affords them the opportunity to rectify such deficiencies. Much of what they acquire is slated for the industrial sector, but that this equipment and technology has been and is important to the Soviet military axiomatic. As I have indicated the audit trail for Western equipment and science and technology is sometimes difficult to follow and its effects even harder to quantify, but we are positive it is there and making a very significant contribution.

It was my intention that this presentation convey to you the intensity, the momentum, the continuity, the seriousness and the profusion of Soviet military systems acquisition. The huge research base which I earlier described is right now planting the seeds for even more sophisticated weapons of the 1990's. Recall the first vugraph which showed the Soviet prediction of their technical leadership commencing in the late 20th century. By whatever yardstick one applies, they are clearly intent upon fulfilling that prophecy.

Senator BYRD. I have a question with a lengthy preamble, but I think the preamble is necessary.

During the era of Secretary McNamara, a decision was made that the United States would continue to build only small missiles with accurate warheads. That was because we believed that the Soviet Union could not and would not attempt to achieve the accuracy achieved by the United States, and, therefore, there was no requirement for the United States to proceed with a heavy missile. We now know that assumption was wrong, and the SS–18 is a highly accurate missile. If my assertion is wrong, correct me. Do you agree with that?

Mr. VORONA. Yes, sir.

Senator BYRD. And it carries 10 very large warheads, as compared with 3 small warheads on the Minuteman III. Is that correct?

Mr. VORONA. Yes, sir.

Senator BYRD. In your statement, you refer to the transfer of 164 Centalign–B precision ball bearing machines from the United States to the Soviet Union. Are you then saying that our industry and our free enterprise system have assisted the Soviet ICBM program by helpto make SS–18 warheads more accurate?

Mr. VORONA. I think there is a definite possibility of that, sir. We know that these machines were acquired by the Soviets. We know that they have the capability to produce the precision ball bearings that are required for very accurate guidance systems such as those undoubtedly used in the SS–18. I cannot go that final step and assert

that those machines were in fact used to produce those components of the guidance system.

But it seems like a reasonable presumption.

Senator BYRD. As a scientist and in your professional capacity, you would say it would be a reasonable assumption that those ball bearings were used?

Mr. VORONA. Yes, sir.

Senator BYRD. In your prepared statement, you refer to the possibility of a new ABM system being developed for nationwide deployment in the Soviet Union. In the event the SALT II Treaty is ratified by the Senate, would it be your professional judgment that we could expect a shift in defense spending in Russia toward acquisition of strategic defense systems, such as the ABM system to which you alluded?

Mr. VORONA. There very well might be a shift, Mr. Chairman. However, in my opinion the Soviets right now are expending considerable resources and manpower on the research and development associated with new ABM systems. I don't think they are lacking at present for resources or priority or commitment to their ABM developments.

Senator BYRD. Has the Soviet Union developed a strong or an effective ABM system?

Mr. VORONA. Sir, the system around Moscow, the one which they are legally entitled to deploy is one based on older technology and clearly has its weaknesses. We recognize them and I am sure the Russians do. However the continuing attempts to upgrade, to modernize, or to improve the effectiveness not only of this system but of newer systems is a key component of their defense expenditures.

Senator BYRD. Over the past decade what has been the comparative degree of activity and effort of Russia and the United States in facilities, personnel, and spending devoted to nuclear weapons research and development?

Mr. VORONA. Sir, I do have some things to say on that subject which I think are of some interest but I would prefer to provide that under classified cover.

Senator BYRD. Please do that.

[The information follows:]

During the past decade, in your professional judgment, what is the comparative degree of activity and effort between Russia and the United States in facilities, personnel, and spending devoted to nuclear weapons research and development?

[Deleted.] After 1970 the effort at US N.W.R. & D. facilities devoted to technologies other than those related to nuclear weapons increased rapidly. The net result has been a gradual increase in total numbers of people and floor area at US N.W.R. & D. facilities. By 1978 almost half of the people employed at the US N.W.R. & D. facilities were engaged in work other than the development of nuclear weapons.

[Deleted.]

Senator BYRD. In your statement you say that the number of ballistic missile launchers in the Soviet Union increased from 1,050 in 1969 to about 1,400 in 1979. In general terms, what are the comparable figures of the number of ICBM's?

Mr. VORONA. U.S. ICBM's sir?

Senator BYRD. Russian.

Mr. VORONA. That is what I had in mind, sir. There are 1,050 ICBM's in 1969 to 1,400——

Senator BYRD. What are the comparable figures for the United States?

Mr. VORONA. 1,054 and that has remained constant.

Senator BYRD. That is my point. Since the middle 1960's there has been no change in the number of U.S. ICBM's—it is 1,054, is that right?

Mr. VORONA. That is correct, sir.

Senator BYRD. You say the Soviets have deployed four new ICBM's in recent years. I assume by that you mean those four new ICBM's were deployed during the decade of the 1970's? Would that be an accurate statement?

Mr. VORONA. Yes, Sir.

Senator BYRD. Would you identify those four new ICBM systems?

Mr. VORONA. Referring, sir, to the SS–13, the SS–17, SS–18, and the SS–19.

Senator BYRD. The SS–13, SS–17, SS–18, and SS–19?

Mr. VORONA. It is the latter three that are the backbone of their strategic rocket force.

Senator BYRD. At what point in the decade were they deployed?

Mr. VORONA. The SS–17, SS–18, and SS–19, which are the crucial part of the force deployed, were really deployed in the latter half of this decade.

Senator BYRD. So, they were deployed after SALT I was approved?

Mr. VORONA. Yes, sir.

Senator BYRD. The Senate approved SALT I in 1971 and the SS–17, the SS–18, and the SS–19, and probably the SS–14, were deployed after the approval of SALT I?

Mr. VORONA. Certainly the SS–17, SS–18, and SS–19.

The SS–13 might have been deployed just prior.

Senator BYRD. But, the SS–18, the SS–17, and SS–19 were deployed after the approval of SALT I?

Mr. VORONA. Absolutely. These missiles were all deployed after SALT I.

Senator BYRD. I voted for SALT I in the belief that it would curb the armament race. Why I am having trouble with SALT II is that there has been a massive military buildup by the Soviet Union since the approval of SALT I. You cite those three new Soviet ICBM's, including the most powerful of all weapons—the SS–18 which were deployed after the first SALT Treaty.

You also state that Russia is "developing unconventional technologies for ABM antiballistic missile use." Are you in a position to indicate here what technologies you have in mind?

Mr. VORONA. In general, sir, we say we expect to see them explore these unconvetional technologies for ABM use. And I refer to laser systems, I refer to particle beam weapons, and I referred to millimeter waves or electromagnetics.

Senator BYRD. Do you see an indication of the Soviet Union building a prototype space laser antiballistic missile system?

Mr. VORONA. Sir, I would like to respond to that in a classified session.

Senator BYRD. Very well.

[The information follows:]

[Deleted.]

Senator BYRD. In economic terms, would you compare the level of effort of the United States and the Soviet Union in antiballistic missile systems?

Mr. VORONA. Sir, I am ill-equipped to talk to you about the United States expenditures in ABM fields.

Senator BYRD. Well, that is zero, isn't it?

Mr. VORONA. I don't believe so, sir. I believe there are moneys being expended on the various technologies associated with ABM development.

Senator BYRD. Could you supply that information for the record?

Mr. VORONA. Yes, sir.

[The information follows:]

I do not have quantitative cost estimates of Soviet ABM programs adequate for such a comparison. However, I would judge Soviet efforts as being considerably greater. You must understand, we do not know the full extent of Soviet ABM programs as we know U.S. programs. I can only compare the part we see. First the Soviets have a deployed ABM system at Moscow which they apparently intend to maintain. The United States has no ABM system deployed, although the existing acquisition radar (PAR) was intended as part of a U.S. ABM system. [Deleted] 64 interceptors and launchers. Also, the Soviets maintain a model Moscow ABM site at their test range which they use, regularly, for troop training. In addition, Soviet ballistic missile early warning radars are deployed much more extensively than U.S. systems [deleted].

The big difference in R. & D. efforts lies in the fact that U.S. programs are characterized as technology and component programs whereas the known Soviet programs appear aimed at achieving deployable weapon systems. The latter requires considerably more cost for construction and testing. U.S. expenditures in fiscal year 1979 for antiballistic missile technologies totaled $315,130,000. This was broken down into $113,510,000 for the Advanced Technology Program, $114,000,000 for the Systems Technology Program and $87,620,000 for the Kwajalein Missile Range.

The United States currently has no procurement programs for ABM system which amount to over $50 million per year. Research on such systems is continuing, however. The last year in which the United States made procurement outlays of $50 million or more for ABM components was 1976.

[Deleted.]

Senator BYRD. What about the Russian efforts in that field?

Mr. VORONA. I don't believe anybody within the community has come up with a figure, certainly not a credible figure as to how many rubles are being expended on Soviet ABM efforts. However, I can tell you from my knowledge of what I see them doing that it is very, very extensive. The program is extensive both in R. & D. and in testing. It is a very serious commitment on their part, most serious.

Senator BYRD. What systems are now under development in the Soviet Union to counter cruise missiles?

Mr. VORONA. Sir, I prefer to respond to that in a classified cover.

[The information follows:]

There are no systems under development in the Soviet Union that we can identify as being a direct response to the U.S. cruise missile. There are, however, several systems [deleted] that may have some theoretical capability to engage the U.S. cruise missile. These systems, the LD/SD system on the modified FOXBAT, the SA–X–10, [deleted] are postulated to have some capability against the cruise missile because they appear to be designed to engage low altitude targets. Our knowledge of these systems is not sufficient to state that they do

have a capability to engage the cruise missile or how well they can engage the cruise missile.

Senator BYRD. Senator Warner?

Senator WARNER. Thank you, Mr. Chairman.

Mr. Chairman, I understand you queried the panel with respect to the reports concerning the construction by the Soviet Union of a nuclear-powered air capable ship, in all likelihood much like our carriers. We had a debate that you and I participated in on the floor of the Senate the other day, again successfully turning back an effort to strike the carrier, the fourth *Nimitz*-type carrier from this fiscal year's budget.

It seems to me that shortly we should share with the American public and our colleagues in the Senate the facts concerning the Soviet activity with respect to the continuing construction of nuclear powered vessels. Could you advise me as to how soon we might expect this type of information being shared with the general public? I mean, we are constantly here in the Congress battling this issue and the public is perplexed as to why America is driving ahead with its nuclear-powered program. At the same time we lack the ability to adequately inform the American public with respect to the Soviet program which, as Senators, we have knowledge that there is some comparability there.

Mr. VORONA. No, sir, I can't answer that question.

Senator WARNER. All right, well, I will press on in other areas with this question in the hopes that soon we will have the flexibility and the freedom with which to advise the American public.

Yesterday, the committee on Foreign Relations by a vote of 8 to 7 failed to adopt an amendment to limit the number of ICBM's allowed each party under SALT II to 200 ICBM's more than the number of fixed launchers permitted each party. During the discussion of the amendment it was established that Russia possesses more than 1,000 reserve ICBM's. Can you give the subcommittee a more accurate figure? How many ICBM's more than 1,000 does Russia possess?

Mr. VORONA. Sir, I would prefer really to answer that question in detail under classified cover. However, I would say that our estimates of the totality of missiles produced by the Soviets are rather shaky. And under classified cover I would like to explain what we do know and what we do not know. I feel very uncomfortable about doing it openly.

[The information follows:]

ANSWER. [Deleted.]

Senator WARNER. Do your efforts coincide with those of Central Intelligence Agency on this subject?

Mr. VORONA. Yes, sir.

Senator WARNER. They do? In 1975 a Minuteman ICBM was fired from its storage canister in a test. This test was widely reported subsequently in the news media as successful. Can Soviet ICBM's be launched from their storage canisters without the requirement of a supporting silo?

Mr. VORONA. Not to my knowledge, sir.

Senator WARNER. In your prepared statement, you describe a Soviet antisatellite system capable of an orbital interceptor. I note that the SALT II Treaty forbids the deployment of weapons of mass destruction in space, but permits the existing launchers of such systems be

retained. Does the antisatellite system to which you refer use a nuclear warhead?

Mr. VORONA. No, sir; a conventional warhead.

Senator WARNER. How many types of antisatellite systems does Russia possess?

Mr. VORONA. One basic type, sir, that has two varients. They differ only in the number of revolutions that the intercept missile has to undergo before it effects intercept.

Senator WARNER. How many launchers are involved?

Mr. VORONA. One launcher per intercept.

Senator WARNER. Thank you, Mr. Chairman.

Senator BYRD. Thank you, Senator Warner.

Dr. Vorona, would you describe the level of effort by the Soviet Union in strategic antisubmarine warfare? In other words, do you see a trend in the Soviet Union toward greater emphasis on a strategic antisubmarine warfare in relation to total military procurement?

Mr. VORONA. Sir, I think I would prefer to answer that in some detail under classified cover. We don't see any tremendous increase. I think what we see is a steady program. Obviously, it is a threat the Soviets keenly feel, and we know that it is a problem that they are devoting resources against. We don't see any dramatic increases in expenditures. It has just been one of steady progression. I will provide more information for you.

[The information follows:]

It is difficult to compare the level of effort in the Soviet Strategic ASW program with other Soviet requirements. However, we have noted the introduction of new and more capable ASW platforms [deleted].

Senator BYRD. Thank you.

From a technological point, how would you compare the United States and Russia?

Mr. VORONA. That is a very difficult question you pose, sir. I would feel a lot more comfortable to be able to respond in specific areas rather than across the board. I really don't know how to handle that.

[The information follows:]

As a general assessment, the United States is believed to continue to hold a technological lead over the Soviet Union. In some specific technical areas, however, the Soviets are on a par with the United States. This is particularly true in technical areas which, for various reasons, the United States has chosen not to pursue or emphasize, such as liquid rocket propellants, vacuum tube technology, HF propagation, and some metalworking and welding processes.

This basic technology lead by the United States, however, can be misleading. It is perhaps of more interest, and even more appropriate, to consider the relative levels of technology apparent in the Soviet deployed weapon systems. [Deleted.] The steady stream of new, improved and more technologically sophisticated weapon systems that have been deployed over the past 10 years reflect a steadily growing technological capability on the part of the Soviets.

Senator BYRD. I can understand that; it is a difficult subject. Let me try one or two words and see if that helps. Would you say that the United States has essential equivalence?

Mr. VORONA. In technology or in forces?

Senator BYRD. In technology.

Mr. VORONA. I think the United States overall, I will take a stab, is the superior. Clearly in the field of computers, microcircuitry computers——

Senator BYRD. You see a gap at the moment. Would you see that gap as narrowed in 1979 versus 1970, say?

Mr. VORONA. I think it is narrowing; it has to.

Senator BYRD. And it has continued to be narrowed?

Mr. VORONA. I think the trend is that way; yes, sir.

Senator BYRD. I think your testimony today has been significant and very enlightening. I would not say it has been totally encouraging from the United States point of view.

I personally feel that one of the worst things a person can do is to underestimate your opponent. That is why I think it is so important that the American people know the facts regarding the Soviet Union.

Not to oversimplify this, but I have been on the ballot 10 times as a politician and, fortunately, have been successful 10 times; but I take the view that the worst thing I can do as a candidate would be to underestimate my opponent. Some of those 10 times that I have been on the ballot, I have run without opposition, but I have run just as hard without an opponent as if I had an opponent. I take the view that somebody might come in at the last moment as a write-in candidate.

It seems to me that the United States had better take that view toward the Soviet Union. We had better not take anything for granted and had better assume that we have a formidable potential opponent in that country.

Of course, we all hope we will never have a conflict, but we can't be too sure; no one can ever be sure. I realize the need for classification in many cases, but I think it important that the Defense Department declassify as much information as possible so that the American people will get as accurate a picture as possible of what the Soviet Union has been doing in the military field in recent years. In my judgment, there has been a massive buildup, and I think your testimony today confirms that.

Thank you very much.

Senator WARNER. Mr. Chairman, one or two other questions.

Senator BYRD. Yes, sir.

Senator WARNER. Is there any update on the Cuban situation you wish to provide the committee with respect to continuation of the Soviets' placing either troops or additional naval facilities there? What has been the trend, if any, in the last 60 to 65 days?

Mr. VORONA. Sir, I must say that particular facet of intelligence is not within my purview, and I would have to beg off. I would get a response for you if you wish.

Senator WARNER. I am quite interested in antisubmarine warfare. What trends do you see there with respect to the Soviet investment in their R. & D. rubles? Are they increasing it?

Mr. VORONA. Sir, I would prefer to answer that under classified cover. However, I don't think we can really say very much about how many dollars—how many rubles they are putting into that function.

Senator WARNER. What sort of emphasis are they working on—acoustical tracking, biological, satellite?

Mr. VORONA. I would say yes to everything you said, plus all kinds of nonacoustic as well. They are covering the waterfront.

Senator WARNER. Would you say there is an increased level of effort in this area?

Mr. VORONA. I would say that it has always been rather significant and I don't know if it has increased, but I would say that it has always been something that has clearly concerned the Soviets: How to counteract that particular force.

Senator WARNER. In connection with the Senate's consideration of the SALT II agreement, there will be substantial floor debate with respect to the Backfire bomber. As the Assistant Vice Director for Scientific and Technical Intelligence, you have told the committee that the Backfire bomber is an intercontinental bomber. Of course, you know, Brezhnev has stated that it is not.

The Committee on Foreign Relations proposes to make part of the instrument of ratification a statement that the Backfire is not an intercontinental bomber. Where are we going with this dichotomy here? Are we, in effect, trying to write into law a statement that, on its face, is wrong?

Mr. VORONA. That is an extraordinarily good question.

Senator WARNER. We will take a little moment to answer it, then.

Mr. VORONA. There are, as you know, different viewpoints within the intelligence community as to the capabilities of the Backfire. If you believe the CIA view, it does not have the capability, unrefueled, to reach the continental United States. We believe it does. So there is no unanimity within the community.

Senator WARNER. Have you studied the scenarios by which it can be operated from those portions of the Soviet Union where its range will enable them to get to such U.S. States as Alaska and possibly the west coast? I have checked those ranges, and it seems to me that they can operate it. Would you like to describe that scenario and what your understanding is?

We have concentrated so much on coming from the European sector to the east coast of the United States, I think we have failed to recognize the capabilities of this aircraft in reaching some of our westernmost parts of the United States, and in particular Alaska.

Mr. VORONA. Yes, sir and certainly the continental United States from Arctic staging bases across the Siberian landmass. We have looked into those.

Senator WARNER. What are the facts on that?

Mr. VORONA. I am reminded, sir, that we have promised the chairman to provide this information under classified cover, and we will lay out that issue for you.

Soviet bombers operating from Arctic bases would require about a 4,000-nautical mile range or radius capability to strike targets in the United States. Backfire with missiles or bombs could meet these requirements on several types of missions:

Pre-strike refueled radius mission, staging from and returning to Arctic bases.

Unrefueled range missions, staging from Arctic bases with recovery in Central or South America.

Pre-strike refueled range mission from bomber bases in Southern Russia with recovery in Central and South America.

Senator WARNER. Well, there is nothing classified about what the range—well, where are the bases in that part of the Soviet Union from which they could operate?

Mr. VORONA. I think these are classified, sir. I can say they are in the Arctic, in the northern reaches of Siberia.

Senator WARNER. We can't share that with the American public? You and I know where they are. You can take a map and practically figure it out. But that is classified?

Mr. VORONA. My understanding is that it is.

Senator WARNER. What about upgrades or improvements in the Backfire and our capability of detecting these improvements? I know they are in the open market today trying to buy some variations of the Rolls Royce designed engines. Are you familiar with that?

Mr. VORONA. Yes, sir.

Senator WARNER. Your voice is barely audible. Is it "Yes, sir"?

Mr. VORONA. Yes, sir.

Senator WARNER. Thank you. Tell us a little bit about their activities.

Mr. VORONA. Again I would like to provide that under classified cover. There is some information, but I cannot——

Senator WARNER. In other words, there is information to the effect that the Soviets are in the open market for the purpose of trying to acquire upgraded technology, and specifically from the Rolls Royce line of engines?

Mr. VORONA. We have known for a long time they have been trying to get turbofans and have been denied.

Senator WARNER. It would appear that these efforts would lead to an increased fuel efficiency with these engines; would it not?

Mr. VORONA. Yes, sir.

Senator WARNER. And that extrapolates clearly into range?

Mr. VORONA. Clearly.

Senator WARNER. Thank you, Mr. Chairman.

Senator BYRD. Thank you, Senator Warner.

Just two additional comments. I refer again to your prepared statement in which you say: "In summary, the Soviets are seeking Western technology and equipment by any and all means." I think that is a very significant statement. And you say: "The Soviet armed forces are considered to be the best equipped and trained forces for launching and sustaining chemical attacks."

In reply to one question that I put to you, you did not have the information readily available regarding the United States efforts on an ABM system. Would you supply that answer for the record? My thinking is that it is zero or approaching that, but it would be well if you would submit that for the record.

[The information follows:]

U.S. forces can only be rated as marginally prepared to survive and operate in a chemical attack. This has been recognized by the DOD and the Congress and an intensive effort to equip all forces with an acceptable minimum level of protective equipment has been launched.

The second issue is that our retaliatory stockpile has deteriorated to less than prudent level. The principal deficiencies are the number of usable munitions and the mix of artillery and aerial systems. There is a serious lack of modern air deliverable munitions to provide full tactical support [deleted].

Another deficiency is the lack of an adequate training program to utilize available equipment. Training requires a realistic scenario and the use of simulant agent materials and "hands-on" use of unit and individual warning and protective equipment.

The above issues are being addressed in U.S. defense programs for research, development and procurement. The broad objectives of this posture improvement program are two-fold.

The first priority objective remains protective capabilities since adequate protection is essential to insure the survivability of the conventional and theater tactical nuclear capability. Current protective capability must be rated as marginal because of shortages of protective clothing and the lack of an adequate area warning system. Therefore, the R. & D. program emphasizes these areas as well as improved prophylaxis and therapy, decontamination technology, other individual protection items, liquid agent detection kits and training agents and devices.

The second objective in the program is the modernization of the chemical weapons stockpile. The principal effort is to develop binary munitions compatible with modern delivery systems. A feasible and safe alternative to bulk-filled munitions would limit hazards in storage areas and would provide greater deployment flexibility. In addition to these safety and logistics features, there would be an elimination of the present costly disposal program. It should be emphasized that the binary concept involves only an advance in munition packaging of present agents; no new agents are required.

Further details on the program for improving the U.S. posture are available in the Annual Report to Congress "Chemical Warfare and Chemical/Biological Defense Research and Development," dated April 1, 1979. This report was provided the Chairman of the Armed Services Committees and the Appropriation Committees of both the Senate and House.

Senator BYRD. Thank you very much, Doctor.

Mr. VORONA. It has been my pleasure, sir.

[Questions with answers supplied follow:]

QUESTIONS FOR THE RECORD BY SENATOR HARRY F. BYRD, JR., ANSWERS SUPPLIED BY MR. VORONA

Senator BYRD. On page 3 of your statement, you report that the number of ballistic missile launchers in Russia increased from 1,050 in 1969 to about 1,400 in 1979. What are the comparable figures, in general terms, for number of ICBM's?

ANSWER. [Deleted.]

Senator BYRD. On page 5 of your statement, you refer to a new Soviet B-1 type bomber expected to be deployed in the early 1980's. Do you expect this bomber to be a cruise missile carrier?

ANSWER. Yes. Cruise missiles are estimated to enhance bomber survivability and flexibility. Such an aircraft probably will not be designed solely as a cruise missile carrier aircraft; it very likely will have the capability to carry cruise missiles as well as other weapons.

Senator BYRD. On page 4 of your statement, you state that Russia is apparently developing a new antiballistic missile system. In your professional judgment, is this system designed to be deployed nationwide?

ANSWER. We have no information directly relating to Soviet intentions for nationwide deployment of an ABM system. The system presently undergoing test [deleted]. Therefore, although we cannot judge whether the Soviets will actually deploy this system, [deleted].

Senator BYRD. You also state that Russia is developing unconventional technologies for antiballistic missile use. What technologies do you have in mind in making that statement?

ANSWER. I was referring primarily to Soviet work on directed energy weapons. Unfortunately, our evidence in this area does not allow a clear or unambiguous exposition of Soviet efforts as they relate to antiballistic missile applications. [Deleted.] I think we must assume the Soviets have been working on such systems for antiballistic missile applications [deleted].

Senator BYRD. I understand that a laser antiballistic missile system would not be prohibited either by the ABM Treaty or by SALT-II. In your professional judgment, what would be the strategic implications of the deployment by Russia of a laser antiballistic missile system before 1985?

ANSWER. We do not presently estimate that the Soviets will have a deployed laser antiballistic missile system by 1985. [Deleted] but, U.S. laser experts seriously question, at present, the feasibility of a ground-based laser weapon for ballistic missile defense. In any event, such a system would require several years of testing with additional years for construction of deployed sites and consequently would not be deployed before 1985. [Deleted.]

It is difficult to give a concise answer to the hypothetical case where the Soviets do deploy an antiballistic missile laser weapon. The strategic significance of such a system would depend entirely on the capabilities one attributes to it. Theoretically, such a system could negate the U.S. ICBM and SLBM threats, [deleted]. In this case, the impact would be more psychological than real.

Senator BYRD. What importance do computers play in developing air defenses and antiballistic missile defenses?

ANSWER. Computer capabilities are key items in developing air defenses and antiballistic missile defenses. Computers are used to control radar beam pointing and energy management, radar signal processing to eliminate undesired signal returns and make estimates of target position and direction, correlate data from multiple radars for display in control centers, and to control interception firing parameters.

In air defense, the last two functions are key to defense effectiveness. A control center receives data from many radars and must first resolve the problem of one target being seen by several radars. Next, the control center computes and monitors the target's flight path. Finally, the control center commits interceptor forces to the target and positions the interceptor for identification or attack. The control center utilizes large, high speed computers to provide these calculations and display of information. The capacity and speed of the available computers limit the number of radar sites and targets that the control center can manage.

In antiballistic missile (ABM) defense, large high speed computers are vital for radar control and signal processing as well as direct control of the interceptor missile. ABM defense can be divided into two parts: (1) detection and assessment of the size of the attack and the areas under attack, i.e., the nature of the attack; and (2) presentation of attack data to the ABM components of the defense for subsequent radar acquisition and interceptor missile flight computation and control.

Detection of the attack is performed by large radars whose beam and energy management are often controlled by a large high speed computer. Upon initial detection of an object, the computer controls the radar beam to confirm detection and calculate the flight path of the object with sufficient accuracy to determine its target and to hand over the target to the interceptor system for subsequent engagement. The latter calculation requires tracking of each object for several minutes while scanning for new objects. The capacity and speed of the available computers limit the number of objects that can be tracked at one time and thus determine the capacity of the detection and assessment system.

The detection and assessment system must also provide sufficiently accurate data for the ABM radar to acquire the target, once this "handover" occurs, data from the ABM radar is processed in a computer to calculate data to launch and control an interceptor missile throughout its flight. The computer controls both the radar and the interceptor missile flight, and thus is a major factor in the ABM system's probability of kill.

The performance of a nation's defensive systems is limited by the capacity and speed of their computers. Technological transfer of either state-of-the-art computers or the technology to build them provides another nation with the ability to increase the capability of their defensive systems, both in improved capability to destroy an attacker and in the increased size of an attack that may be successfully countered.

Senator BYRD. What potential value would the Control Data Corporation 7700 be if the computer were to diverted to Russia?

ANSWER. The CDC computer's capability is well beyond that of the latest generation Soviet computers. It has the potential for very significant military applications, particularly in the strategic area. Some of these applications are:

1. *Surveillance and Warning.*—Application of a computer such as the CDC 7700 would significantly improve the overall Soviet capability in this area. The improved data handling capability would permit a more reliable and efficient tracking of each target, as well as increase the number of targets that could be tracked simultaneously. The overall resolution of the surveillance and warning system would be upgraded through the increased data handling capability.

2. *Strategic Command and Control.*—An effective automated command and control system is believed to be a major objective of the Soviet Union. This requires the processing of large amounts of data, and the communication of results in near-real time. The CDC 7700 would be extremely valuable for such an application. It could increase the amount of data that could be processed and

significantly improve the near-real time capability of the Soviet command and control system.

3. *Antiballistic Missile Defense*.—The CDC 7700 could significantly improve the performance of vital components of a Soviet ABM system. A large high speed computer such as the CDC 7700 could improve multiple radar control and signal data processing, as well as provide for better direct control of the interceptor missile.

4. *Nuclear Weapon Design*.—High speed computers play an important role in the development of simulation models, test data processing and analyses of design alternatives—all critical to the development of an optimum nuclear weapon design. The CDC 7700 could be applied to these functions and would improve the Soviet R&D ability in this important area.

Senator BYRD. Do you have any evidence of such diversion?

Answer. DIA has no evidence that this has occurred, however, the Commerce Department (Compliance Division) is currently investigating this possibility.

Senator BYRD. Has this computer been supplied to China?

Answer. China has unsuccessfully attempted to legally import the CDC Cyber 76 computer. No evidence of illegal acquisition of the 7700 is available to DIA.

Senator BYRD. What are potential military applications of the CDC 7700?

Answer. Some of the potential military applications are surveillance and warning, antiballistic missile defense, command and control (strategic and tactical), nuclear weapon design, satellite ground control and data processing stations and antisubmarine warfare signal processing. The response provided for the question concerning the potential value of the CDC 7700 diversion (question 10.b.) is also applicable to this question.

Senator BYRD. You state that a rather phenomenal number of new Soviet engineers are being graduated each year. Are these engineers equal to, from an educational standpoint, engineers graduated from U.S. universities?

Answer. The Soviet Union does indeed graduate large numbers of engineers each year—at least 270,000 graduates in 1979, which is over 5 times the number graduated in the United States. The quality of the education given these engineering graduates varies considerably across the Soviet Union—just as it does in the United States. In general, the education received by the engineering graduates of the best Soviet schools is on a par with that of the best U.S. schools. Taken as a whole, the overall quality of Soviet engineering education is probably somewhat lower than in the United States. The main point concerning the education of Soviet engineers, however, is the *type* of education. The Soviet engineering graduate has been very narrowly trained and educated for a specific position in industry that in general was determined 5–10 years previously through the Soviet centralized economic planning process. This Soviet educational philosophy prepares an engineer quite well for his very specialized niche upon graduation, but his flexibility and versatility to fill other related engineering positions is very limited. He is educated/trained not just in the general "chemical engineering" field but, for example, in the "technology of chemical fibers." For this job he is probably well trained, but he would not be able to move into another chemical engineering specialty—of which the Soviets have some 25 specific categories.

Thus, there is a basic difference between the United States and USSR in the philosophy followed in the education of an engineer in the respective countries. It is this philosophy, rather than the quality of education itself, that sets the U.S. and U.S.S.R. engineers apart. The Soviets have apparently recognized the problems inherent in their approach and have stated intentions to modify their engineering education. This is a change that will not come about quickly, but will require at least several years before a significant change in their educational approach is noticeable.

Senator BYRD. How efficient do you believe the Soviet R. & D. system to be in comparison to the U.S. system? In other words, are the Soviets spending more for R. & D. and getting less than the United States?

ANSWER. In general, the evidence on Soviet R. & D. indicates a generally inefficient R. & D. system that requires the Soviets to invest more resources than is believed would be necessary in the United States. The vertical organizational structure of the Soviet ministries that perform their R. & D. tends to discourage lateral exchanges and flow of information between ministries. The result is that there is considerable duplication in many areas of research and little, if any communication between organizations. This in turn has resulted in requirements for more resources than would otherwise be required.

The Soviet R. & D. system is indeed considered more inefficient than that of the United States. It should be noted, however, that while the Soviet R. & D. system may be inefficient, it has been effective in developing new and improved weapon systems that continue to increase Soviet military capabilities. At a tremendous cost in resource investments, both human and capital, the Soviets have built a technological base that, while it may operate in a generally inefficient environment, has produced a steady stream of military systems reflecting both evolutionary and, at times innovative, advances in their technological capabilities. That the Soviets have made, and continue to make, such significant resource commitments indicates their intent and drive to improve their R. & D. The Soviets do indeed appear to be spending more for military related R. & D., but the results that we have observed indicate that we cannot say they are getting less than the United States. We can say that if the U.S. R. & D. expenditures were at a comparable level, we would expect a higher rate of return.

Senator BYRD. The Soviets seem to introduce a surprising number of new classes of aircraft, ships and weapons. Would you describe the Soviet approach as one of product improvement, as opposed to the U.S. approach of a quantum jump in technology for new systems?

ANSWER. The Soviets' weapons acquisition philosophy has been primarily one of evolutionary development. Extensive use of off-the-shelf components, subcomponents and approved technologies continues to be a characteristic of Soviet weapons development. New subsystems, such as an aircraft engine, are developed only when existing hardware cannot meet performance requirements for the new weapons system. Even new and innovative systems use existing proven technologies adapted to the new design, whenever possible. As the supporting technologies evolve and advance, the tendency appears to be to incorporate these advances through product improvement and modification of the existing systems to overcome or correct recognized deficiencies.

This rather conservative approach can be explained in part at least, by the heavy emphasis the Soviets place on meeting their development schedules. This encourages the designers and developers to use proven technologies as a risk-reducing approach. There is no real incentive to exceed the minimum performance requirements specified for the new weapon systems. Innovative new weapon systems most often involve rather ingenious designs that permit adaptation and utilization of existing technologies rather than the use of leading edge-of-the art technologies that are considered a higher risk by both the designer and the production plant.

Senator BYRD. The U.S. product improves existing weapons via the modification route. Do the Soviets modify extensively, or do they merely bring out a new class of weapon with evolutionary improvements?

ANSWER. They tend to do both. The Soviets have over the past several decades developed a steady stream of new ground naval and aerospace weapon systems. The majority of these weapon systems represent evolutionary improvements. Even after a system is fielded, testing often continues and modifications may occur as a result of feedback from operational troops. There are truly new classes of weapons such as the BMP, that appear occasionally as exceptions to the general rule. Even these, however, form the basic system of a series of modifications that either take advantage of technical advances or are intended to expand the role of the basic system into other mission areas.

Testing may also continue (or be restarted) to enhance the capability to cope with a perceived or read deficiency. [Deleted.]

In regard to aerodynamic weapon systems, the Soviets have a history of modernizing their fighter aircraft and cruise missiles through evolutionary improvements. Examples are the MIG-21 (Fishbed) series, the Mig-23/27 (Flogger) Series and the SU-7/17/20/22 (Fitter) series. Each of these aircraft designs has undergone evolutionary improvements in propulsion, aerodynamics, armament, and avionics. The overall result is that later models of these aircraft can deliver a larger and more varied payload with better accuracy and to a greater range than the earlier variants. In regard to cruise missiles there appears to be a commonality between some missile types as proved components are used in different missiles. [Deleted.]

Historically, the Soviets have not extensively modified their Ballistic Missile Systems. They have introduced new missile systems with significant improvements to replace older systems.

In the naval area, the Soviets have both modified existing designs and developed evolutionary follow-on systems. For example, the Victor Class SSN

is being produced in its third production modification, the Charlie Class SSN is in its second variant, and all Yankee and Delta SSBNs are variants of the same engineering design. Evolutionary follow-ons include the Kiev Class carrier which added a V/STOL aircraft capability to the sea-based helicopter capabilities of the earlier Moskva Class.

In ground weapon systems the Soviets have exhibited a conservative but incremental approach emphasizing evolutionary improvements. Reliance is placed on the use of proven technology with selective upgrading of major components leading to gradual but certain product improvement. One of the greatest strengths of Soviet development programs is the continuity of effort leading to substantially improved equipment being fielded on a regular basis.

The general trend in Soviet weapons development appears to be intended to develop, produce and deploy a given weapon system that will meet specified performance requirements, with a minimum of risk and within the scheduled development period. As new technologies evolve, the basic system will then be modified, upgraded and improved as necessary.

Senator BYRD. You state that the Soviet general purpose naval forces are improving in quality if not in numbers. Have the Soviet general purpose naval forces been getting smaller and do you expect any reduction in numbers in the future?

ANSWER. The overall size of the Soviet general purpose naval forces has not changed significantly since last year. Aggregate tonnage has been increasing. [Deleted.]

Senator BYRD. Are Soviet weapons systems generally as reliable and maintainable as comparable U.S. weapons systems?

ANSWER. United States and Soviet weapon systems reflect varying degrees of emphasis regarding reliability and maintainability and no general statement comparing all types of weapons—ground, naval, and air—would suffice for all circumstances of use.

In major ground weapon systems, a comparison of U.S. and Soviet medium tank reliability and maintainability is the most illustrative of different approaches. Soviet tanks are designed with narrower reliability limits than U.S. tanks. Emphasis is on high reliability over a short time frame (short mileage limits) while U.S. design goals are for high reliability over a relatively long time frame (high mileage limits).

Preventative maintenance requirements are about equal for United States and Soviet tanks. [Deleted.]

Soviet naval weapon systems generally emphasize simplicity and ruggedness to keep maintenance requirements to a minimum. However, sophisticated systems are utilized when simple equipments cannot accomplish the mission. [Deleted.]

[Deleted.] For the above reasons, it is extremely difficult to make a direct comparison between United States and Soviet reliability standards.

In regard to aircraft systems, Soviet fighters, in general, are [deleted] than comparable U.S. fighters. Soviet cruise missiles, fighter-launched missiles, and helicopters generally are [deleted].

Within the limited scope of available data, the Soviet Ballistic Missile systems are considered to be as reliable and maintainable as comparable U.S. missile systems.

Senator BYRD. The Soviet military has over twice as many personnel as the United States. Assuming the United States had an equal number of military personnel to the Soviets, would you expect U.S. military expenditures to be less than, equal to, or greater than current Soviet military expenditures?

ANSWER. If the United States had the same number of military personnel as the Soviet Union, the dollar costs of the Soviet military effort in 1978 would still have exceeded those of the United States by $20 billion.

Senator BYRD. The Soviets have more than double the number of military personnel and reportedly spend 50 percent more than the United States for military procurement. In your opinion, are the Soviets modernizing the various elements of their armed forces at a greater rate than the United States?

ANSWER. Comparisons with U.S. expenditures by the major resource categories [deleted] reveal that during the period 1968–1978, the Soviet [deleted] costs exceeded those of the United States [deleted]. In 1978 alone, the dollar cost of Soviet investment programs is estimated to have exceeded comparable U.S. outlays by about 65 percent. Over the long term, such a heavy and continuous allocation of resources to Soviet military programs has resulted in the fielding of a wide variety of new and/or improved weapons systems and equipment for their forces across the board.

In my opinion, the foregoing tends to support the thesis that, in some cases qualitatively and in others quantitatively, the Soviets are modernizing their armed forces in some areas at a greater pace than the United States.

Senator BYRD. Are the Soviets more equipment-intensive than the U.S. military forces?

ANSWER. The recent trends in the modernization of the Soviet armed forces illustrate a significant equipment-intensive approach in all areas of strategic nuclear as well as tactical air, ground and naval weapons systems. The Soviet emphasis across the board has been toward more complex, versatile systems involving for example, much more advanced and better integrated electronic subsystems. The overall result is improved firepower, range, accuracy, mobility, and flexibility of many of the front-line Soviet weapon systems. This has raised the Soviet level of equipment-intensity to near that of the United States. A continuation of the current trend will change the balance in the near future.

Senator BYRD. Do the Soviets spend, in procurement terms, more per military man than the U.S.?

ANSWER. In 1978, the estimated dollar costs of procurement per individual member of the military was [deleted] percent higher for U.S. forces than for those of the Soviet Union.

Senator BYRD. How much lead does the United States have in Computer Technology?

ANSWER. With respect to Ballistic Missile Systems, modernization is the term This lead would probably be much greater but the USSR has been able to circumvent some NATO Coordinating Committee (COCOM) controls in obtaining automated test and production equipment for integrated circuits and computers and they will probably continue this practice of covert purchases.

Senator BYRD. Does modernization of or expansion of forces best describe Soviet procurement efforts?

Answer. With respect to Ballistic Missile Systems, modernization is the term which best describes Soviet procurement efforts. Typically, new deployments of each ballistic missile system are made for a few years after which the systems are modernized or replaced with new ones. During the course of the modernization program the Soviets have increased the number of warheads available to their planners.

In regard to aerodynamic weapon systems, the Soviets are both modernizing and expanding their forces. New systems are being developed and many older systems are being produced with improved capabilities. The SU–7/17/20/22 (Fitter) and Mig–23/27 (Flogger) are examples of older fighter aircraft weapon systems being modernized. Modernization of forces, however, would best characterize Soviet procurement efforts in aerodynamic weapon systems.

In the naval area, modernization of general purpose and strategic forces appears to be following a period of expansion covering several decades.

The Soviets have both modernized and expanded their ground forces during the past several years. Modernization is exemplified by the appearance of new medium tanks, new self-propelled artillery pieces during the 1970's, and new models of semi-automatic antitank guided missiles.

Within Soviet strategic defense forces both modernization and expansion are occurring. New systems are built to address new threats, but, historically, older systems are retained in the force.

Senator BYRD. Would you, for the record, develop comparative rates of modernization for various elements of Soviet and U.S. military equipment (e.g., fighter aircraft, cruisers, destroyers, frigates, attack submarines, tanks, armored personnel carriers, etc.)?

ANSWER. In the ballistic missile area, the U.S. modernization over the past 10 years has been less dramatic than the Soviet Union because the Soviets started from a much lower level of technology and capability. The Soviet modernization program has significantly improved the technology incorporated in their ballistic missiles to the point where they are ahead in throw weight, silo hardening, number of RVs per booster, and warhead size. The United States maintains the lead in accuracy and warhead efficiency. [Deleted.]

As for force modernization, the number of U.S. ICBM launchers has remained constant at 1054 since 1969, but 550 Minuteman III ICBM's have been developed and deployed as replacements for some Minuteman I and II ICBMs. The United States also developed the Poseidon SLBM and completed deployment of the system in 1967. The Triden I missile is now in production and deployment of this system will increase U.S. reliability and effectiveness.

Since 1969, the Soviet have developed and deployed seven basic ICBM systems with [deleted] payload modifications. They are the SS–9 Mod 3 and Mod. 4, SS–11 Mod 2 and Mod 3, SS–13 Mod 1 [deleted], SS–16, SS–17 Mod 1 and Mod 2, SS–18 Mod 1, Mod 2 and Mod 3, and the SS–19 Mod 1 and Mod 2. [Deleted.]

In the naval area, comparative rates of modernization are deceptive in that requirements and force levels are not comparable. For the record, however, the following numbers of new classes have been introduced since 1960:

	United States	U.S.S.R.
Cruisers	6	6
Destroyers	3	1
Frigates	5	10
Attack submarines	3	12

In ground weapon systems, medium tanks serve as the best illustration of comparable major U.S. and Soviet modernization programs. The attached chart indicates the time-phasing of these programs. Soviet programs are characterized by their continuity of design and production resulting in the fielding of large numbers of tanks. U.S. programs emphasize continuous design effort but intermittent and much more limited production.

The Soviets generally modernize their fighter forces at a rate higher than the United States. However, Soviet fighters tend to be more specialized than U.S. fighters.

[Table deleted.]

Senator BYRD. On what date was approval to export Centalign B Precision ball bearing machines granted? Who approved?

Answer. On August 28, 1972, the Department of Commerce approved the export of the Centalign B Precision ball bearing grinding machines, manufactured by the Bryant Grinder Corporation. Complete Congressional testimony on this topic may be found in "Hearing Before the Subcommittee on International Trade and Commerce of the Committee on International Relations, House of Representatives, Ninety-Fourth Congress, Second Session, Part II, April 12, 1976, 'Export Licensing of Advanced Technology : A Review'."

Senator BYRD. Assuming an ICBM can be launched from its storage canister when the canister is connected with a command and control system and firing mechanism, in your judgment, should the canister be considered a launcher at the time of final assembly with the command and control system and firing mechanism? I note that the SALT II treaty does not bring under the limits of the treaty any launcher until the launcher is finally assembled and moved from the place of final assembly. In your personal professional judgment, could ICBMs be stockpiled at separate storage sites which were themselves launch sites although not silos, and could those stored ICBMs in their canisters be converted into ICBMs contained in canister launchers yet not moved from the place of final assembly and, thus, create more than 1,000 launchers not subject to SALT limits? In your personal professional judgment, would it be technically feasible to construct such launchers without supporting silos and in a manner by which they were not subject to the limits of SALT II?

Answer. A shipping canister is not, by itself, sufficient to launch a missile. Substantial additional equipment would be needed for a launch capability, including, for example, an erection mechanism, a missile support device, fueling equipment, the usual ground support equipment, and command and control facilities. [Deleted.] Although the development of such equipment is technically feasible, [deleted], such equipment capable of supporting ICBM launches would be countable toward SALT II limits on ICBM launchers.

Your reference to ICBM launchers not being accountable until they leave the place of final assembly could only apply to mobile ICBM launchers, which are banned until 1982. Article VI., Section (a) provides that the treaty limitations would apply to "operational" mobile launchers, regardless of where they are located.

Senator BYRD. In 1975, a Minuteman ICBM was fired from its storage canister in a test. This test was widely reported subsequently in news media as successful. Can Soviet ICBMs be launched from their storage canisters without the requirement of a supporting silo? If so, please identify which missiles can be so launched?

Aviation Week has reported that the SS–9, SS–11, SS–17, SS–18, and SS–19 can all be launched from their storage canisters without the necessity of a

supporting silo; the SS–17 and SS–18 are cold launched and can be reloaded into a silo, but "canister launch" is a separate issue and involves the entire Soviet reserve ICBM force.)

Answer. [Deleted.] The basic requirements for launching an ICBM are that it be held in a vertical position prior to launch and then released at the time of lift-off, and that exhaust gases be allowed to escape. [Deleted.]

Senator BYRD. Does Russia possess any ballistic missile interceptors capable of intercepting ICBMs at midcourse? What development programs for midcourse intercept are now underway?

Answer. I think the answer to your question is no, but, this depends on what you mean by midcourse. For example, an ICBM on a typical trajectory from the United States to the USSR would reach the midpoint of its trajectory at about 4000 kilometers ground range from its target and would be at about 1200 kilometers altitude at this point. No known Soviet ABM interceptor existing or being tested could reach the midpoint of that trajectory.* The GALOSH interceptor associated with the Soviets' Moscow ABM system has a maximum range of about [deleted]. Thus it would intercept an ICBM only in the latter part of its trajectory. However, it does intercept the target outside the Earth's atmosphere [deleted]. Therefore, if by midcourse, you mean the whole exoatmospheric trajectory, the answer to your question would be yes, but, only the last part of the midcourse trajectory. [Deleted.]

Senator BYRD. In your prepared statement, you describe a Russian antisatellite system capable of an orbital intercept. I note that the SALT II treaty forbids the deployment of weapons of mass destruction in space but permits existing launchers of such systems to be retained. Does the antisatellite system to which you refer use a nuclear warhead? How many types of antisatellite systems does Russia possess, and roughly how many launchers are involved?

ANSWER. The Soviets have tested [deleted] an orbital antisatellite interceptor system. [Deleted.]

Senator BYRD. Is Russia developing a ballistic missile defense system comparable to the Homing Overlay experimental system on which some preliminary work has been accomplished in this country? If so, is Russia ahead or behind in that effort? What type of computer is used?

ANSWER. The Homing Overlay Experiment (HOE) is designed to demonstrate the ability of an onboard optical system to acquire targets in flight, to isolate the RVs from other objects of the threat complex, and to guide the missile to final intercept at a miss distance small enough for a kill with conventional warheads. Such an intercept would be exoatmospheric, nonnuclear, and at a relatively long range. [Deleted.] They probably have, however, the optical technology to support such a program although it is not yet believed to be suitable for a missile seeker (i.e. flight rated). [Deleted.]

Senator BYRD. In your prepared statement, you refer to a new ABM system possibly being developed for nationwide deployment in Russia. In the event the SALT II treaty is ratified, would you expect a shift in defense spending in Russia toward acquisition of strategic defensive systems such as the ABM system to which you have alluded? Do you expect a shift in emphasis to occur *in any event* toward strategic defenses?

ANSWER. There is no reason to believe that the Soviets will reduce the level of Soviet expenditures for offensive systems. We expect spending in this area to continue at the same level or even to increase as new ballistic missile systems are tested and deployed. Although we are unable to predict with certainty their total military expenditures, we anticipate a sizeable increase in defensive spending independent of treaty ratification considerations. [Deleted] in the Moscow area. In addition, they will probably continue to increase testing their ABM and SPRINT-like interceptors at Sary Shagan [deleted]. The above arguments thus mitigate against any reduction in military spending or any transfer of resources from offensive to defensive programs.

Senator BYRD. What is the main military mission of the hypersonic SA–11 missile? Is this missile intended for defense against the cruise missile, or is it a basic ABM missile? Is it simply a tactical missile?

ANSWER. [Deleted.]

Senator BYRD. The next witness is Mr. Steven Rosefielde, professor of economics, University of North Carolina. Mr. Rosefielde is a noted student of the Soviet economy and a recognized authority on Soviet

*Furthermore, this point would be beyond the line-of-sight of ABM radars which are used for missile guidance.

military spending. Professor, the subcommittee is pleased to have you here to testify this morning.

Before proceeding, may I ask my colleague this. I need to leave here at 10:35 for a few minutes to make a speech in the Senate, but I will be back within 15 to 20 minutes. Would the Senator chair during that time?

Senator WARNER. I would be happy, Mr. Chairman, to chair during that period. I have to go on the floor with the energy amendment at about 11:15, so the timing will coincide.

Senator BYRD. Thank you.

Professor, would you proceed.

STATEMENT OF STEVEN ROSEFIELDE, ASSOCIATE PROFESSOR OF ECONOMICS, UNIVERSITY OF NORTH CAROLINA

Mr. ROSEFIELDE. Thank you. First I would like to say I am honored to be here. I deeply appreciate being invited to this session. I would like to also state at the outset that I am going to speak largely in my capacity as a professional economist, which I have special expertise in. I have prepared a paper for you, but I am not going to read it.

Senator BYRD. It will be inserted in the record in full.

[The prepared statement and attachments follow:]

PREPARED STATEMENT OF STEVEN ROSEFIELDE, ASSOCIATE PROFESSOR OF ECONOMICS, UNIVERSITY OF NORTH CAROLINA, CHAPEL HILL

The economic burden of defense can be used to analyze a variety of important questions including:

1. *Intention.*—the primary objective of a nation's military effort
2. *Resource allocation.*—the effect defense expenditures have on the structure of the national economy
3. *Growth potential.*—the limitations imposed on the growth of future military and civilian production by the pattern of present resource allocations

I would like to restrict my remarks today to only two of these issues, resource allocation and growth potential.

I. RESOURCE ALLOCATION

The basic measure used to assess the size of the defense burden is the share of the gross national product devoted to military ends including procurement, investment, operational expenditures, maintenance, repair, and employment. Some sample estimates of the Soviet defense burden computed as a share of GNP are reported in Table 1. The first series presents official Soviet estimates of their defense burden which indicate a GNP share of 5.5% in 1960, falling to 3.6% by 1977.[1] Series two and three are derived from CIA estimates. The former represents the Soviet defense share valued in 1955 prices and assumes as the Agency contends that the much higher figures reported subsequently, due in part to information obtained covertly by a knowledgeable informant, are attributable almost entirely to hidden inflation.[2] As is readily observed the Soviet defense

[1] Official Soviet NMP data was transformed into GNP figures with the aid of a GNP/NMP ratio formed by dividing the CIA's ruble GNP estimate for 1970 (CIA, A (ER) 75–76, USSR: Gross National Product Accounts, 1970, November 1975) with the NMP figure reported in Narkhoz. This ratio 1.17 is substantially lower than prior estimates made by Abram Bergson for the year 1955. Bergson's implied ratio is 1.3. See Abram Bergson, The Real National Income of Soviet Russia Since 1928, 46. His GNP estimate for 1955 in 1955 prices is 118.3 billion rubles. NMP was 91.1 billion rubles. If the Agency's GNP estimates are in error and Bergson's earlier calculations more near the mark then the burden figures reported in Table 1 should be reduced approximately 11 percent.

[2] The Agency's pre-revision 1976 procurement estimate was 5.5 billion rubles. It's post revision estimate 15.8 to 18.5 billion rubles. The discrepancy was attributed to hidden inflation, even though official Soviet price indices disconfirm this assertion. See "Estimated Soviet Defense Spending in Rubles, 1970–1975," CIA, SR–76–10121U, May 1976, 1–2. Also see Rosefielde, "Is the CIA's Defense of the Integrity of its Ruble Procurement Estimates Persuasive?", draft, August 1979, cf. Estimated Soviet Defense Spending: Trends and Prospects, CIA, SR 78–10121, June 1978. Procurement here is set at 90 per cent of half the total defense expenditure based on U.S. accounting conventions. For 1970 this works out to 19.1 billion based on a 42.5 billion ruble mean total (p. 2).

burden on this measure rises slightly 1960–1970 and then declines 25% 1970–1975. The Agency's estimate is almost exactly twice that officially acknowledged by the Soviets for each year reported in the table.

Series three again values the Soviet defense share in 1955 prices but this time presumes the opposite possibility, that all of the increased defense expenditures discovered by the Agency in 1976 for the years 1970 and 1975 pertain to previously undetected real Soviet procurement.[3] This implies that there has been no hidden inflation in the Soviet Union, a claim the Soviets themselves officially endorse. Both the level and the rate of growth of the Soviet defense burden are significantly greater on this basis than either of the alternative series shown in Table 1.

Table 2 reports several additional variants of the CIA's estimate of the Soviet defense burden. Variant III uses a narrow definition of procurement intended to conform with U.S. Government accounting conventions. This standard is widely employed in policy discussions of Soviet defense expenditures and is commonly expressed as the range 11 percent to 13 percent.

TABLE 1.—SOVIET DEFENSE EXPENDITURES AS A SHARE OF GNP: ALTERNATIVE ESTIMATES, 1960–75

	1960	1970	1975	1978
1. Official Soviet	5.5	5.3	4.1	3.6
2. CIA (variant I)	10.0	10.9	8.2	----
3. CIA (variant II)	10.0	14.0	15.2	----

Sources: Soviet NMP for the years 1960, 1970, 1975, and 1977 in billions of rubles were respectively 145, 290, 363, and 403. See "Narkhoz Za 60 Let," 485–6 and "Narkhoz 77," 404. Soviet defense expenditures stated in the national budget were 9.3, 17.9, 17.4, and 17.2. See "Narkhoz 72," 724, and "Narkhoz Za 60 Let," 652. The CIA mean defense expenditure are 17, 47.5, and 57.5. See "Allocations of Resources in the Soviet Union and China," 68–9, and "Estimated Soviet Defense Spending in Rubles, 1970–1975," CIA, SR 76–10121U, May 1976.

The CIA's mean pre and post revision estimates for 1970 are, 23.75 and 47.5. See "Estimated Soviet Defense Spending in Rubles, 1970–1975," 1.

Soviet NMP figures are converted to GNP using a correspondence ratio, 1.17 implied by Rush Greenslade in "The Real Gross National Product of the U.S.S.R., 1950–1975," in "Soviet Economy in a New Perspective," JEC, 1976, 278. The underlying CIA GNP (factor cost) figure for 1970 is 340 billion rubles. See 284. If turnover tax is included GNP rises to 370 billion rubles.

The official Soviet GNP defense shares are formed as the ratio of the "Narkhoz" budgetary defense expenditures to "Narkhoz" NMP converted to GNP with the CIA GNP/NMP coefficient for 1970.

CIA variant I uses the same method as above, but substitutes CIA estimates of Soviet defense expenditures for the "Narkhoz" figures. These CIA defense estimates are supposed to be in constant 1970 prices. The Agency, however, has two sets of 1970 prices, a prerevision set and a post revision set prepared in 1976. The figure for 1960 is officially valued in prerevision 1970 prices, the figures for 1970 and 1975 in post revision 1970 prices. The 1960 figure, however, is really not valued in prerevision 1970 prices. It is valued in 1955 prices. The 1955 price level according to the Agency's adjustment is 6 percent below the 1970 price level. Official Soviet price data indicate a 5 percent increase in the aggregate industrial price level (including turnover tax) and a 3 percent decline 1970–77. The retail price level 1955–77, which isn't restricted to industrial goods, has been virtually unchanged. The aggregate price level on an official basis as a consequence probably increased 3–4 percent during the sixties and fell roughly 2 percent in the seventies. It can be assumed therefore as a working hypothesis that the Soviet GNP series used here is in constant prices, whether reference is to the 1955 or the 1970 price set. Any error caused by this assumption should be of trivial dimensions so long as hidden inflation is insubstantial. If hidden inflation is significant our results will overstate the Soviet defense burden.

Since the Agency's defense expenditure estimates are in inconsistent prices, 1955 and post revision 1970 prices, in order to compute valid GNP shares they must be reduced to a common standard. In CIA variant I this is accomplished by leaving the 1960 value in 1955 prices and adjusting the Agency's 1970 and 1975 estimates which are valued in post revision 1970 prices. The Agency's post revision prices which exceed the official Soviet price level roughly by a factor of 3, concentrated in weapons procurement, is adjusted for the putative influence of "hidden inflation" by using the Agency's procurement estimate for 1970 in 1955 prices, roughly 5.5 billion rubles. This figure is 10.3 billion rubles less than the post revision estimate, approximately 15.8 billion rubles. The 1975 "hidden inflation" adjustment is made simply by multiplying the 1970 procurement figure by the Agency's estimated procurement growth rate (5.5 $(1.045)^5$=6.9 billion rubles) and substituting this estimate for the procurement value used by the Agency (15.8 $(1.045)^5$=19.7 billion rubles) for 1975. As a result of these adjustments the GNP defense expenditure ratios are conceptually valued in constant 1955 prices. The rate of procurement growth is found in the CIA report "Estimated Soviet Defense Spending in Rubles, 1970–1975," page 1. Cf. Greenslade, "The Real Gross National Product of the U.S.S.R., 1950–1975," in "Soviet Economy in a New Perspective," JEC ,1976, 276.

The CIA variant II estimates are computed on the assumption that there is no hidden inflation, an assumption which conforms with the official Soviet view. The 47.5 billion ruble defense expenditure on this interpretation is treated as if all expenditures were real expenditures valued in 1955 prices. The compound real rate of procurement growth during this period, given this assumption can be estimated by comparing real procurement in 1970 and 1960: $(15.8/5.5)^{1/10}$=1.111 or 11.1 percent. Using this growth rate to extrapolate 1975 procurement yields 15.8 $(1.111)^5$=26.8 billion rubles, which is 7.1 billion rubles greater than the Agency's total defense expenditure estimate for 1975 gives a revised figure of 64.6 billion rubles, which is used to compute the GNP defense share for 1975.

[3] Rosefielde, "Real Soviet Arms Procurement Expenditures 1960–1978: The Credibility of the CIA's Theory that Hidden Inflation Explains the 236 percent Error in the Agency's Estimate of Soviet Procurement for 1970" in Rosefielde, editor, World Communism at the Crossroads: Military Ascendancy, Political Economy, and Human Welfare, Martinus Nijhoff, Boston, 1980.

Variants IV and V compute the Soviet defense burden according to *Soviet conventions*. Variant IV reports the CIA's pre-revision burden estimate, 7 percent. (If United States accounting norms were applied the corresponding figure would be 6.3 percent). Variant V shows the effect of the "new information" obtained by the Agency in the early seventies, taken at face value without adjustment for hidden inflation or the real implied rate of procurement growth 1960–1970. This burden measure is approximately twice that of variant IV for the year 1970.

All of the burden estimates derived from CIA data have one thing in common. They exceed the level claimed by the Soviets. Most of the CIA series indicate a burden in excess of 10 percent.

Aside from matters of definition the remaining estimates differ primarily in their treatment of procurement. Variant II assumes that observed changes in the current value of Soviet armaments reflect real quantitative and qualitative growth. Variants I and III impute the same observed change to hidden inflation. Variant I implies that Soviet procurement, unlike other defense expenditures, did not grow at all from 1960–1970. Implausible as such an assertion may appear today, CIA director Colby took exactly this position before the Joint Economic Committee of Congress in 1974.[4] Variant III implies a real rate of procurement growth 1960–1975 of 3.4 percent.[5] With other components of Soviet defense spending growing somewhat faster than procurement this measure suggests that aggregate Soviet defense expenditures rose proportionally with the gross national product.

TABLE 2.—SOVIET DEFENSE EXPENDITURES AS A SHARE OF GNP: ALTERNATIVE ESTIMATES

	1960	1970	1975
1. CIA (variant III)		12.5	
2. CIA (variant IV)	10	7.0	
3. CIA (variant V)	10	14.0	13.5

Sources: Variant III. Soviet defense spending "as defined in U.S. budgetary accounts" is given as 42.5 billion rubles (mean) for 1970. See "Estimated Soviet Defense Spending in Rubles, 1970–1975," CIA, SR 76–10121U, May 1976, 1. Burden is calculated by dividing this figure with the Agency 1970 GNP estimate, 340 billion rubles.

Variant IV. The Agency's mean prerevision 1970 Soviet defense expenditure estimate is approximately 23.75 billion rubles "as the Soviets might account for their defense effort." Ibid. The burden is computed as in variant III.

Variant V. The Agency's mean post-revision estimate for 1970 is 47.5 billion rubles using Soviet accounting methods Ibid. Burden is computed in the same manner as Variant III.

In attempting to discriminate the relative merit of these variants it is essential to recognize that the CIA has never put forward any credible evidence supporting its assertion that the discrepancy between its pre and post revision estimates is attributable to hidden inflation.[6] The Agency position in this regard can be traced back to 1962 when the CIA published its first Soviet industrial production index which grew much more slowly than the official index. Even though the CIA's series explicitly excluded weapons, this disparity was imputed not to the fast growth of omitted subgroups (weapons) but to *hidden inflation* in the *unobserved* arms procurement sector.[7] In the ensuing years this attribution has hardened into dogma.

[4] Allocation of Resources in the Soviet Union and China, JEC, Washington, D.C., 1974, 68–9.

[5] The discrepancy between the real rate of procurement growth for variants I and III is due to the difference in the prices used. Pre-revision 1970 prices were used in variant I, post revision 1970 prices in variant II. Since the pre-revision prices are essentially 1955 prices slightly adjusted the procurement growth behavior implied here is highly anomalous. The Lespeyres rate is less than the Paasche rate.

[6] See Rosefielde, "A Comment on David Howard's Estimation of Hidden Inflation in the Soviet Retail Sales Sector," First Draft, June 1979. Rosefielde, "Are Soviet Machine Building and Metalworking Prices Significantly Distorted by Hidden Inflation?", Third Draft, July 1979. Rosefielde, "Are Soviet Industrial Production Statistics Significantly Distorted by Hidden Inflation?", First Draft, August 1979.

The Agency's ruble price data is very febrile. Much of it isn't price data at all, but cost estimating relationships for 1970. See Rosefielde, "Is the CIA's Defense of the Integrity of its Ruble Procurement Estimates Persuasive?", First Draft, August 1979 and Rosefielde, False Science: The CIA's Methodology For Estimating Soviet Defense Expenditures, Transaction Press, Rutgers, N.J., 1980.

[7] Rush Greenslade and Phyllis Wallace, "Industrial Production in the USSR," Dimensions of Soviet Economic Power, JEC, Washington, D.C., 115–136; Rush Greenslade, "Industrial Production Statistics in the USSR" in Treml and Hardt, editors, Soviet Economic Statistics, Duke University Press, 1972, 155–194; Rosefielde, "Are Soviet Industrial Production Statistics Significantly Distorted by Hidden Inflation?", footnote 32.

The Agency's attitude in this regard is incompatible with sound scientific analysis. In science all theories are hypotheses until they are empirically verified. Unless strong empirical evidence is available to refute the supposition that Soviet procurement statistics are no more biased than other data on civilian industrial production, it is impermissible to contend that the 236 percent discrepancy in the pre and post revision Agency arms procurement estimate is due to hidden inflation just because it is possible to imagine that this is a plausible explanation.[8]

Without compelling proof to support the Agency's perception of the scope and magnitude of hidden inflation in the military machine building metalworking sector, scientific neutrality requires that the discrepancy between the Agency's pre and post revision estimates for 1970 be attributed to the undetected growth of real Soviet procurement 1960–1970. This implies that variant II is the most unbiased of all the Agency's measures of the level and trend in the burden of Soviet defense, and therefore that Soviet defense expenditures have increased rapidly during the 1970s as a share of the Soviet gross national product.

While such an inference is reasonably sound it should not be construed as a blanket endorsement of variant II. Measuring defense burden entails a variety of complex and controversial judgments which render the CIA's estimates less certain than is usually acknowledged. Although the Agency routinely claims that its procurement estimates are accurate within 10 percent, their calculations were in error by 236 percent in the one and only instance in which covert information made verification possible.[9] In view of the revelations of 1976 variant II is unlikely to be substantially off the mark, but this should obscure the lingering uncertainties.

In my opinion variant II seems a little too low.[10] The Soviet defense burden was probably closer to 14.5 percent in 1970 and 16.8 percent in 1975 based on *Soviet accounting norms*. The corresponding share using U.S. budgetary practices would be 13.3 percent and 15.7 percent. Relatedly I estimate that contrary to the Agency's published estimates instead of arms procurement growing *zero* percent 1960–1970, and 4–5 percent 1970–1975, Soviet weapons production has steadily increased since 1960 at a rate somewhere between 8–13 percent. While this rapid growth outstripped the increase in Soviet GNP, it was more or less proportional to the expansion rate in the machine building metalworking sector (11.6 percent) where most weapons are produced,[11] and implies an aggregate defense expenditure growth rate of only *6.2* percent (using the mean procurement growth rate of 10.5 percent).

TABLE 3.—SOVIET DEFENSE EXPENDITURES AS A SHARE OF GNP, 1928–55

	1928	1937	1940	1944	1950	1955
1928 ruble factor cost	2.5					
1928–37 mean ruble factor cost		10.5	17.3			
1950 ruble factor cost				39.8	10.9	10.7

Source: Abram Bergson, "The Real National Income of Soviet Russia Since 1928," Harvard University Press, Cambridge 1963, 237.

[8] Rosefielde, "Real Soviet Procurement Growth 1960–1978" in Rosefielde, editor, World Communism at the Crossroads, Martinus Nijhoff, Boston, 1980.

[9] Ibid.

[10] My estimates take as their point of departure Pitzer's Soviet procurement figure for 1970, which corresponds closely with William Lee's calculation, 18.5 billion rubles, and the Agency's upper bound burden estimate expressed alternatively in American and Soviet accounting norms, 55 and 60 billion rubles respectively. As before (see Table 1) I add the difference between the Agency's procurement figure for 1975 ($15.8\ (1.045)^5$) and the value implied by the observed growth rate ($15.8\ (1.11)^5$) which prevailed 1960–1970 to the Agency's estimate of total Soviet defense expenditures. In this instance I use the upper bounds instead of the CIA's mean values. Had I employed a procurement growth trend based on Pitzer's estimate, 18.5 rather than the SCAM figure 15.8, the upper bound burden estimates for 1975 would rise to 16.3 percent on an American, and 17.4 on a Soviet accounting basis. See John Pitzer, "Reconciliation of Gross National Product and Soviet National Income," Soviet Economy Branch (Eastern European Division OER*), December 1977. Paper presented at the NATO Colloquium, July 1977; and William Lee "The Estimation of Soviet Defense Expenditures for 1955–1975: An Unconventional Approach." Praeger, New York, 1977.

The reader should also be alerted to the fact that the Agency continuously updates its defense expenditure estimates for prior years. This is a reasonable thing to do, but it means that no single best set of procurement numbers exists. My estimates should be read in this light. It is entirely possible that they might vary by a few percent if alternative CIA figures for the same year were employed. Since the reliability of the Agency's own values for years other than 1970 is indeterminable, my estimates must be appraised accordingly.

[11] Narkhoz 68, 186; Narkhoz 77, 124.

Soviet defense expenditures reported in the official Soviet budget were:

1933	1.4	1941	80.0
1934	5.0	1942	108.4
1935	8.2	1943	125.0
1936	14.9	1944	137.9
1937	17.5	1945	128.2
1938	23.1	1946	72.6
1939	39.2	1947	67.0
1940	56.7		

NOTE.—These figures are in billions of current rubles. Making a lowance for inflation Bergson includes: According to rough calculations, Soviet Russia's military outlays probably amounted to one-seventh of her gross national product in 1939. As a result of the war's destruction, the Russian national income is now less than it was in 1939; hence the defense expenditures now must be a larger share of a reduced total product." From 1939–1947 therefore Soviet burden exceeded 14 percent. Also note that Bergson's analysis is predicated almost entirely on official budgetary data. Had he used current CIA accounting conventions his estimates may well have been higher.

Source: See Abram Bergson, "Russian Defense Expenditures," Foreign Affairs, January 1948, 373–5.

II. GROWTH POTENTIAL

Are burden levels of this magnitude credible, and if so can they be sustained into the foreseeable future? Table 3 illuminates these questions. According to the meticulous calculations of Abram Bergson based largely on official budgetary data, the burden of Soviet defense has consistently exceeded 10 percent since 1937. During the prewar years 1938–1940 defense as a share of the Soviet gross national product was approximately the same magnitude as it is today, 14 percent-18 percent. From 1941 to 1945 defense expenditures reached astounding proportions on the order of 40 percent of the gross national product. After the war Soviet defense expenditures receded but remained high by world standards. Historical precedent therefore rather than casting doubt on burden estimates in the range of 14%–18% actually lends credence to their validity.

It must be noted, however, that the Soviets were able to sustain their extraordinary defense expenditures 1937–1948, at least in part, because of their heavy reliance on forced labor. Although the data are controversial, a comprehensive analysis of the literature on Soviet forced labor indicates that more than 10 million workers were employed in Gulag on average during this period, excluding an estimated seven million prisoners of war consigned to the camps towards the end of World War II.[12] Can the Soviets sustain defense expenditures at past levels now that Gulag has been abolished?

This would be a very troublesome question if the assertion that forced labor had been abolished were true. Although Gulag itself was formally disbanded sometime around 1956, forced labor was not eliminated.[13] Instead it was administratively reorganized in a manner consistent with Khrushchev's economic reforms. Current estimates of forced labor in the Soviet Union vary widely from 1–4 million. Good evidence exists favoring the upper end of this range and it is by no means inconceivable that the number of forced laborers significantly exceeds 4 million. While these appalling estimates are well below the levels of the past they indicate that conventional standards of evaluation cannot be facilely applied in assessing the sustainability of the Soviet defense burden. Soviet policymakers are in a position to squeeze their work force in ways which would be unthinkable in the United States and they have the infrastructure available to rapidly expand their control if they choose. In my opinion therefore the Soviet defense burden is easily sustainable at the current level.

Sustainability, however, can also be construed in an alternative sense. If the Soviets persist in devoting a large proportion of their resources to defense doesn't it follow that they will necessarily induce a slowdown in their growth rate which will impose a natural check on their armaments program?

It would be very congenial to suppose that this were true. Table 4 indicates that aggregate Soviet growth has certainly declined during the military buildup 1960–1977. Using the official Soviet measure of national income (NMP), the growth rate for the first half of the seventies was only slightly more than ¾ of

[12] Rosefielde, "How Reliable Are Available Estimates of Forced Concentration Camp Labor in the Soviet Union?", First Draft, April 1979.

[13] Swianiewicz, Forced Labor and Economic Development, Oxford University Press, London, 1965, 50.

the rate which prevailed in the sixties. This retardation has persisted in the ensuing years, a trend which is expected to continue. Much the same pattern holds for the decisive machine building metalworking sector, except here the decline has been more gradual, with the average rate of growth remaining impressively high.

The evidence presented in Table 4, however, is inconclusive. The retardation observed in the 1960s isn't entirely coincident with the trend in Soviet defense burden. Soviet economic growth first started to noticeably diminish in the mid-fifties, not the sixties. This suggests that a variety of long-term secular factors may be at work here in addition to any effect specifically attributable to the defense burden.

TABLE 4.—TRENDS IN POSTWAR SOVIET NATIONAL INCOME (NMP) AND MACHINE BUILDING AND METALWORKING PRODUCTION

	1950–60	1960–70	1970–75	1975–77
1. National income	10.2	7.1	5.5	5.2
2. MBMW	15.6	12.1	11.6	9.1

Source: National income growth rates in constant prices are reported in "Narkhoz 77," 403. Machine building and metalworking growth rates in constant prices are reported in "Narkhoz 77," 125, "Narkhoz 72," 165, "Narkhoz 69," 146.

These factors include:

1. A growing labor shortage.
2. Increased priority accorded to qualitative rather than quantitative growth.
3. The increasing complexity of planning as economic development proceeds.
4. A diminished rate of new capital formation.
5. Diminished technological progress.
6. The increased difficulty of acquiring fuel and other natural resources.

All these factors, except the fifth are stressed by the Soviets themselves, with particular emphasis placed on the first two explanatory variables. Western specialists have tended to place greater weight on diminishing technological progress (and/or the output elasticity of capital) and the growing labor shortage although no clear consensus exists on these matters.

Although all the factors listed above may in some sense be associated with the growth of the Soviet defense burden, only in the case of explanation 4, the reduction in the rate of new capital formation is the linkage obviously significant. Investment durables (excluding construction) and weapons are the principal outputs of the machine building metalworking sector. Acceleration in the growth of one of these components (weapons) is likely to be causally related to diminishing rates of growth of the other (investment durables). The correspondence here, however, is incomplete. The Soviets if they chose to could have diverted more resources to the MBMW sector to sustain the production of investment durables, or they might have reduced the share of MBMW output earmarked for the civilian consumers' durable market. While these actions might have generated opposition in some quarters, this resistance could have been significantly mitigated by placing the burden of foregone consumption on the shoulders of the concentration camp population.

It follows from these considerations that increased Soviet defense expenditures don't necessarily imply a reduction either in the aggregate rate of growth or in the growth rate of Soviet arms procurement for the foreseeable future. In this regard it should be noted that productivity gains in the Soviet MBMW sector appear to grow somewhat more rapidly than in the economy at large.[14] If these productivity gains are proportional in the civilian and military components of MBMW the growth of the real resource cost of defense may constitute less of a drag on the aggregate growth rate than might casually be supposed.

Whatever the cause, however, aggregate Soviet economic growth is in a downtrend. Doesn't this imply that the Soviets will soon be forced to curtail their rate of new arms production? One could quibble here about the degree to which growth retardation necessarily constrains the future growth of Soviet procurement. If

[14] Rosefielde, "Production Functions and the Estimation of Opportunity Costs in Centrally Planned Economies," Second Draft, June 1979.

push came to shove and the Soviets wanted to achieve *decisive* strategic [15] and tactical superiority over the West in the shortest possible time, I do not doubt that they could do it by squeezing consumption and tightening the screws on forced labor. In my opinion, however, this expedient will be unnecessary. By holding the line on manpower and support costs, and reducing the growth of procurement a few percent from say 10 percent to 8 percent the Soviets will be easily able to expand their military power at a rate far greater than is politically feasible in the West. Moreover, Soviet weaponry is swiftly approaching, and in some instances already exceeds, the state of the art in the West. The combination of relatively rapid procurement growth and enhanced technological proficiency will give them *decisive* superiority in the not too distant future without entailing an unacceptable, or unsustainable burden providing their aggregate growth doesn't fall much below its present rate of 4 percent–5 percent per annum.

Will the growth of national income and machine building metalworking production decline sufficiently to forestall the Soviets from achieving *decisive* military superiority? No scientifically credible answer can be given to this question. The Soviets do face a number of serious economic problems. Manpower constraints, diffusion of new technology, minority conflicts, dwindling natural resources, agricultural failure, etc. Analysts have at various times identified one or more of these factors as critical, and predicted a further sharp contraction of the Soviet growth rate on that basis. They may be right. But lest we confuse desire with reality it should be clearly understood that at the present stage of Soviet studies we simply do not understand the dynamics of the Soviet economic system well enough to make scientific forecasts of any reliability.[16] The Soviet economy is rife with conflict and contradiction. The progress made in their defense sector is simply astounding, and contrasts sharply within the endemic failures of their consumer sector. While the fact that the Soviet economy has surmounted greater difficulties in the past than it confronts today doesn't mean that the Soviets will succeed in sustaining a long run aggregate growth rate between 3 percent to 5 percent, with procurement rising 5 percent to 10 percent, it would be unwise to assume that a continuous secular decline in Soviet growth is a sure thing. The present threat posed by Soviet militarization in my opinion isn't likely to abate because of automatic, self limiting dynamics of the Soviet growth process.[17] Over the long term the Soviets are likely to attain decisive strategic and tactical superority over the West, with minimal risk, if they are willing to exercise due patience.

Mr. ROSEFIELDE. I have also written six papers which are in the process of being published and in the public domain. I have a book coming out on these issues in 4 or 5 months. It goes to many of the technical details. The people can be directed to my published material.

Let me therefore try to summarize my paper, bringing out what I think are important issues for you to consider. The first point I would like to make is to bring out an evaluation of the Central Intelligence Agency's data, the CIA's estimates of Soviet defense expenditures, dollars, rubles, growth rates, and sundry topics.

In my opinion, the Central Intelligence Agency's estimates are highly unreliable. They are unreliable in dollars; they are unreliable in rubles. In my view, the Agency tends to project an image of hard science regarding their estimates. Their estimates have an unacceptable discretionary element in them, a discretionary element which is usu-

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[15] The term "decisive" can be used in an absolute or relative sense. Absolute superiority which is tantamount to Soviet hegemony over the US would be very difficult to achieve in the foreseeable future. Relative superiority, analogous to the power advantage we enjoyed during the Cuban missile crisis is a much easier goal. The "decisive" superiority I envisage the Soviets attaining is of this sort, allowing them to impose their own political solutions on third parties because the U.S. lacks sufficient, credible counterforce potential to forestall Soviet intervention.

[16] Rosefielde, "Knowledge and Socialism," in Rosefielde, ed'tor, Economic Welfare and the Economics of Soviet Socialism, Cambridge University Press, New York, 1980.

[17] Rosefielde and Lovell, "The Impact of Adjusted Factor Cost Valuation on the CES Interpretation of Postwar Soviet Economic Growth," Economica November 1977. In this essay we demonstrate econometrically that technical progress may have been increasing rather than decreasing in the USSR throughout the postwar period.

ally concealed in their published material, and it would be difficult for anyone except——

Senator BYRD. May I interrupt at that point? Are you suggesting that the Central Intelligence Agency's estimates are underestimating or overestimating the Soviet military spending?

Mr. ROSEFIELDE. I will get to that shortly and discuss that in any detail you desire. My statement here is a statement about fundamental estimology. I feel direct cost estimology used by the CIA incorrectly passes itself off as scientific. The scientific potentials are very, very low indeed and I am prepared to document that in detail.

Now, that is just a beginning. There is a great deal of information available on Soviet defense expenditures, and I would like to state some of my views about them.

First, in my opinion, the burden of Soviet Defense is much larger than imagined in the Central Intelligence Agency's estimates. In my opinion, the burden of defense has grown significantly in the seventies. In my opinion, the burden of defense is not—I would like to emphasize that—is not high by historical Soviet standards.

I have gone back over the records. My own professor, my own teacher, was Professor Abel Burgson of Harvard. I have gone over his work on this subject and I have discovered that Soviet burdens were on the order of anywhere between 15 and 20 percent during the period of 1935–40. They went higher than that during the war. Burgson's estimates indicate that in the period of 1930–35 the defense burden was below 10 percent in the Soviet Union.

There is new research currently being done in Britain—it was called to my attention only 1 week or so ago, so I haven't had a chance to look at it personally and comment on its accuracy—which indicates that the view that the Soviet defense burden was below 10 percent in the period of 1930–35 was wrong and that, in fact, the defense burden was in excess of 10 percent from 1930 continually, without any abatement, through the present period.

So there is no evidence that I am aware of that is not controversial—there is always evidence of some sort or another—there is no evidence that is not controversial to indicate that the Soviet defense burden has been below 10 percent since what we call first-rate forward Soviet rapid industrialization began under Stalin in 1930. That is to give you a feel of what we are dealing with.

I would like to parenthetically insert here a judgment that I hadn't planned to make but I would like to at this point. The Soviet Union as a socioeconomic phenomenon is very complex and very alien to our perceptions. You have to look at it very, very carefully in many ways. If you try to extrapolate Soviet intentions, Soviet motivations, Soviet actions in terms of our own experience, you are very apt to go wrong.

I insert that remark here because Americans might casually assume that the Soviets wouldn't have a record of high defense spending, of high burdens of the sort that I have indicated to you.

Now, that is a statement of burden. I am prepared to make the statement that in the early years, from 1930 to Stalin's death, much of the burden of defense in the Soviet Union was borne by forced labor. In the question period I will be glad to give you all of the details that are in my possession on this particular subject but this might be another

example of what I mean when I say that approaching an analysis of the Soviet Union in terms of American perspective can be misleading, and I caution you.

Senator BYRD. You mentioned the question period. Before I overlook it, the committee staff has some questions which I would like to ask if you would be willing to answer for the record.

Mr. ROSEFIELDE. Yes, sir.

Senator BYRD. Thank you.

Mr. ROSEFIELDE. I will give you more details later. But, roughly speaking, as a rule of thumb, the current understanding, scholarly understanding, is that forced labor in the Soviet Union from the late thirties on was roughly 10 million. You may need to ponder that because it is, in fact, an enormous number. And the Gulag literature documents a great deal of this information.

I mention forced labor not to disparage the Soviet Union and to discredit socialism and so on; I mention it because forced labor constitutes a vehicle by which a society can absorb the burden of very high defense expenditures.

It is usually assumed that in a free labor force, if you squeeze consumption very hard in order to provide an augmented defense expenditure format, there will be a great deal of resistance, decrease in productivity, et cetera. So the Soviets, by having a captive forced labor army at——

Senator WARNER. May I interrupt at this point as the chairman is walking out. It would be helpful for you to define what you mean by "a captive labor force." And did you use the term "slave labor?"

Mr. ROSEFIELDE. No, I didn't.

Senator WARNER. Why don't you define "slave labor," "captive labor" and whatever else so we can get a comparison.

Mr. ROSEFIELDE. That is a fair question. I will premise my remark by saying there is a metaphysical aspect to all of this. Every term that can be used has a historical context, and I would prefer not to use the term "slave labor" for that purpose. For example, Soviet labor—there are several concepts of "forced labor," several distinctions I can make which, I think, will help you. The first type of forced labor are people behind barbed wire in concentration camps and they are being compelled to work on industrial projects and construction projects. When I give you a figure of 10 million in the 1930's, I refer to people behind barbed wire doing forced labor of that sort.

There are, in addition, various and sundry forms of forced labor that are less compulsory. There are people in the Soviet Union who live in exile; they are restricted to certain areas. They are not behind barbed wire but are doing forced labor. There are other gradations of forced labor that are less compulsory.

In my testimony today, at least for the period of Stalin, I refer to the kind of forced labor that is behind barbed wire.

Senator WARNER. Could you describe the situation today?

Mr. ROSEFIELDE. OK. This is more speculative because——

Senator WARNER. More speculative, you say?

Mr. ROSEFIELDE. Yes, sir. It is more speculative because history has a certain virtue of being able to acquire more knowledge with the passage of time, more data and information. And, as I said, I will be glad to provide you with some details on the thirties. The present in-

formation we have is of a more speculative character. It is based on information provided to us by immigrants from the Soviet Union. It is based on demographic data as well. It is based on scholarly work done by others besides myself.

An estimate of between 1½ to 4 million in forced labor in the Soviet Union—not all behind barbed wire, because here we have to make the distinction—is not unreasonable. There are reports on this in the Economist, which is a British publication, done by some Jewish immigrants to Israel, with a great deal of documentation behind it.

There is, as I said, very interesting demographic data on the issue. But as far as information available in open sources, I would have to characterize these numbers as having a very speculative dimension. We don't have Soviet KGB-documented evidence of the number of people in the concentration camps.

You might wish to observe that, if the figure is as high as 4 million, a figure I don't rule out——

Senator WARNER. A figure you do not personally rule out?

Mr. ROSEFIELDE. Correct. I would personally credence a figure of 4 million without very much hesitation. Even a number that big, though, wouldn't be larger than 5 percent of the Soviet industrial labor force. So you don't want to exaggerate in the other direction and say that Soviet labor is all prison labor, all convict labor, all forced labor. That would be an inaccurate characterization of the situation in the Soviet Union.

The point that I am trying to suggest that we at least keep in mind in assessing the true burden on Soviet decisionmakers in the defense sector is that there exists a large number of industrial workers in the Soviet Union who are in a position to be squeezed hard by the regime in terms of decreases in their consumption standards, in terms of increases in the amount of labor time that they have to devote to production that would cushion the social implications of the Soviets of maintaining a very large military presence.

Having said that, I also want to indicate that all of the evidence we have suggests that conditions which exist in the Gulag today have improved over the past. We don't see any evidence of large-scale mass murders. We don't see evidence of people being driven out into the tundra to work 18 hours a day and die. There is a more rational use of forced labor resources going on. This is what the evidence indicates.

Senator WARNER. How much of that force is in one way, directly or indirectly, helping the Soviet defense effort for its offensive——

Mr. ROSEFIELDE. I have no way of knowing that because the information, as I said, is speculative, is not very well documented. That was the case, let me indicate, in the past. Similar reports came out in the thirties and were vigorously rejected by scholars. It is only in recent years that we have begun to see that the rejection of the estimates of the thirties were too hasty.

Now let me go on to some other things. I want to discuss the burden in a dynamic sense. I want to discuss burden from the standpoint of foreseeable rates of Soviet growth. It has been suggested by the Central Intelligence Agency and a great many other scholars as well that the Soviet Union is suffering from growth retardation, a slowdown in the Soviet growth rate. I agree with that assessment. The Soviet growth rate has been slowing down.

But my reading of the evidence—and I consider that I have the professional capability of doing so—is that the growth retardation is much less, is much lower, the decline is not nearly as great as some people have indicated.

I have written a paper published in Economica in 1977, based on rather sophisticated econometric analyses, that technical progress in the Soviet Union is increasing and increasing rapidly. While the growth is declining, the decline in the Soviet growth rate is imputable to other factors and is being offset by gains in Soviet technical progress.

You can probably observe from your own experience in these proceedings that there is a great deal of evidence that the Soviets have made a great deal of progress in forging ahead on the technological plane. And I myself would be very reluctant to rule out the possibility that in the 1980's Soviet growth won't slow down to 3 percent, 2 percent, 1 percent and so on and so forth, constituting a self-checking process on the Soviet's ability to allocate funds for defense.

That is the bottom line in this issue. If the growth rate is very, very slow, then the burden of defense increases quite rapidly as far as the Soviets are concerned. And I wouldn't rule out a continuous decline in the Soviet growth rate; but the evidence put forward, I want to suggest to you, is not nearly as strong as it is often made out to be.

To summarize, my judgment would be something like this: First, my estimate of the Soviet rate of growth of procurement—I am speaking about only procurement—in the 1960's and 1970's is about 11 percent or maybe a little bit higher, maybe 13 percent. And I will explain to you in questioning how I arrived at that figure.

The Soviets, in my view, have been able to maintain that 11-percent rate of growth of procurement while having their economy grow in the aggregate about 5 percent a year. If the Soviets in the future were to continue to have a growth of GNP on the order of 3 or 4 percent, in my opinion the Soviets would very easily be able to sustain growth rates of procurement 8, 10 or 11 percent. I can't be very precise on these matters.

But the cumulative impact of the difference between the Soviet rate of growth and the American rate of growth of procurement is such that over time the Soviets, simply by force alone, by sheer brute force, will have a preponderent advantage over the United States in the defense area.

So it seems to me misleading to try to infer from trends, from the declining trend of the Soviet growth rate, that there are very severe restraints being placed on the Soviets to curtail their military expenditures.

I don't agree with that position. And I take the position, in fact, that if the status quo is maintained, the Soviets will gain a preponderant advantage over the United States in the volume of procurement, the volume of weapons they have, in very short time. The reason I say "in very short time" is because we are talking about a compound rate of growth process and we are talking about very rapid rates of growth of weapons systems.

Senator WARNER. Could I ask a question. In 1976 the CIA doubled its estimate of Soviet military spending. How much did that estimate increase, in percentage terms, in the area of military hardware procurement?

Mr. ROSEFIELDE. The information available in the public domain is difficult to interpret. They don't publish exact numbers; they publish ranges and bounds, and you have to derive the exact numbers from various ratios.

I am doing the best I can with this kind of information. I have discovered a variety of numbers. In revised 1970 ruble prices for procurement, I have discovered numbers like $15.8 billion. I have discovered numbers of $18.5 billion, and I have discovered numbers which ranged from $18 billion to $20.3 billion.

I don't know what accounts for this discrepancy because there is a big discrepancy.

As best I can tell from open sources, sir, for the year 1960 the Agency's estimate of Soviet defense expenditures was $5.5 billion.

Again, let me emphasize this is the best I can tell because you have to do a lot of fancy footwork with the numbers to get at this. You have access to these numbers and you can verify whether what I am saying is reasonable or not. So we are talking about an increase in the Agency's procurement estimate of anywhere from 15.8 divided by 5.5, which gets you to about a 176-percent increase to 18.5, the figure is 236-percent increase or 20.3; and I lost my calculator yesterday and I was looking at these calculations on the way here; I haven't done it. The figure would be perhaps even approaching 300 percent. My calculator has been returned to me.

Senator WARNER. Would you say the point is about doubled?

Mr. ROSEFIELDE. No; more. Close to tripled.

Senator WARNER. Another question: Why is the revised figure for military procurement substantially higher than the revised figure for overall military spending?

Mr. ROSEFIELDE. Let's think about this realistically. There are certain elements of the defense program that make no sense, that increase very rapidly. If the Soviet manpower were increased at 11—I am going to simply use the convention I used in the paper, which I think is lower than what I believe—I believe we are talking about a 436 figure there, but I will use the figure in the paper which is procurement to $15.8 billion in 1970. Using that lower figure, I get for the period 1960 to 1970 a rate of growth of Soviet defense expenditure of 1.1 for procurement, just for procurement. If that rate were used for manpower, you would have more than the doubling—well, you would have a tripling—no, you would have more than a doubling of the standing Soviet army, if you like, of $4.5 million to $9-some million.

A doubling of that order doesn't make any sense from a military point of view.

It seems rather straightforward that not all elements of a defense program should expand at an equal level from the standpoint of the decisionmakers that the most rapidly increasing component, the one that is defense expenditure, should be procurement.

Senator WARNER. Let me ask this question and see if it won't frame your answers.

In analyzing the level of Soviet military activity, which is a better yardstick, military procurement or overall military spending?

Mr. ROSEFIELDE. My personal view is that procurement is the best of the indicators; but the other indicators should not be ignored.

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There are different senses in which they can be best. I would like to insert a distinction between "intentionality" and "facilitation." This is an academic concept. Let me spell it out.

Many people worry about whether or not we can read, from rates of growth of Soviet procurement, the intentions of the Soviet military leadership, in other words, what do they want to do? Can we guess? Can we divine their intentions? I once considered writing a book on this subject and gave it up. I gave it up because I discovered it was largely a metaphysical exercise; you could get whatever conclusions you wanted out of it; it was simply too speculative.

So I drew a distinction between "intention" and facilitation," without worrying about why the Soviets, without worrying about why they would choose to increase the procurement at a rate of 11, let us say. I would rather be concerned about the implications for our own ability to defend the United States if the procurement is, in fact, growing at 11 percent.

I made a calculation to indicate, based on a somewhat higher rate than 11 percent, that in the period of 1960 to 1970, the CIA's estimates of procurement do not count—I will use that language—do not count between 30 billion rubles and 50 billion rubles' worth of Soviet hardware. If you translate that figure to dollars and compare it to the United States' situation, an undercounting of $30 billion to $50 billion of American hardware—I don't want to be too misleading about this—would be a staggering underestimate.

Let me say something, if I may, about why I get an 11 percent rate of growth, because I want to introduce it here, since it is germane to the question that you just raised.

The gap between 15.8, 18.5, 20.3 billion rubles in 1970, estimated by the agency procurement and their initial figure for the same and the figure for 1960 of 5.5 billion, which is, as best I can determine, roughly their figure for 1970, the gap here has been attributed by the agency to hidden inflation.

Let me restate that, because it is rather complicated and you may have missed my implication on the first go-around. According to the Central Intelligence Agency's data in 1955 prices—they called them 1960 prices—no, excuse me—1970 prices—there is only a slight difference between these—and I will get into the nuances later, but I prefer not to bother with it now—their estimate of the growth of Soviet procurement from 1955 prices from 1960 to 1970 is zero growth. The same figure is given for 1960 as for 1970 estimated: roughly 5.5 billion rubles of procurement in both years.

The gap, then, between the figure in 1970 and 1955 prices before the revision and the postrevision estimate of the agency—this 236 that I am referring to—is either a measure of some undetected increase in Soviet weapons or improvement in the quality of Soviet weapons; it is either that or it is either real growth that hasn't been captured before, or it is attributable to something called hidden inflation.

I have looked into the matter of hidden inflation very, very carefully. I have spent several years looking into it, so I am speaking with some confidence on this particular matter. I have written three papers which are in the process of being published and will be in the public domain, and you can examine what I have done.

My view is that there is no credible evidence whatsoever for the agency's contention that hidden inflation explanation, any significant proportion of the gap between the pre- and postrevision procurement estimates, none whatsoever. The Soviets themselves, in all of their published material, say categorically that there is no inflation in the Soviet Union, that is, for their industrial statistics, that is, for aggregate statistics. We know that this statement is overdrawn; we know the statement is overdrawn, but it is not overdrawn by much.

Senator WARNER. It defies all laws of human nature?

Mr. ROSEFIELDE. Not really, because all prices in the Soviet Union are fixed by the state; it is not a market economy and the prices do not respond to forces of supply and demand. Once those prices are on the books, they have the force of law. Anybody who trades at a price, in the Soviet Union, that is not established on the books has committed a criminal offense. The banks regularly check every single transaction—not in general or randomly—every single transaction, to make sure that the transactions that take place in Soviet enterprises are transactions which are occurring at established prices and only at established prices.

You may call it repressed inflation; and as an economist you know I would love to get off into a discussion of that sort of thing. I can agree with you in part that it is, but in terms of their established prices, their established prices have been fixed and been firm and have not changed.

Senator WARNER. Professor, would you be willing to consider some questions from the members of the committee?

Mr. ROSEFIELDE. I will consider any question whatsoever.

Senator WARNER. I would like to ask if you would accept them and, at your convenience, please respond, and they will be made a part of the record.

Senator WARNER. At this point in time we must proceed with another witness. We thank you very much for your contribution today, and we recognize a very high degree of professionalism that you offer to your country in this area. Thank you, sir.

We will now have Mr. W. T. Lee return with a supplementary statement to the subcommittee.

Mr. Lee, we welcome you back again.

STATEMENT OF W. T. LEE—Resumed

Mr. LEE. Senator, thank you very much for the opportunity to address this committee once again.

May I preface my supplementary statement by saying that I am very much in agreement with Professor Rosefielde on the question of repressed inflation and hidden inflation in the Soviet Union.

There is some general inflation; it does not apply to the defense establishment to any significant degree, by any evidence that I have been able to come across. And I believe Professor Rosefielde and I have independently reached the same conclusion, proceeding from a somewhat different basis. He is a very highly trained professional economist, which I am not; however, I do claim to be very familiar with Soviet data, well beyond that which many people with a much better theoretical training than I have.

Now, as to my prepared statement, in view of the testimony given by the CIA representatives at the November 1 hearing, I believe this short supplemental statement is in order.

In his testimony before this subcommittee on November 1, 1979, Mr. Don Burton stated that the CIA believed my estimates of Soviet defense expenditures and procurement to be in current rubles. I wish to reiterate that my estimates presented to this subcommittee are in constant 1970 rubles, as Don well knows and agreed to after the hearing.

Aside from keeping the record straight, there is an important point at issue here. The CIA's so-called "constant 1970 rubles" for procurement and some operating costs are constructed quite differently than Soviet constant 1970 rubles for the same goods. Without going into the arcane details, suffice it to say this: CIA's "constant 1970 rubles" are not Soviet rubles at all for much procurement and for some operating costs.

In the summer of 1977 Mr. Derk Swain—who works for Mr. Burton—agreed with me that CIA constant rubles are not Soviet constant rubles. Mr. Swain then said that CIA would state this publicly in 1978. In the latter year we had a second conversation in which he again agreed that CIA constant rubles were not Soviet rubles and admitted that the CIA had not so stated as he had promised a year before. "Maybe next year," Mr. Swain said in 1978.

1979 is here and nearly gone, and the CIA is still presenting its constant-ruble constructs as if they were Soviet constant rubles. In effect, the CIA's constant rubles are simply constructs generated by the CIA's direct costing model. The Soviets do not spend CIA rubles any more than they spend dollars. Nor do they keep their accounts or make their decisions in CIA rubles. The Soviets use their own rubles for such purposes.

Estimates of Soviet defense expenditures in Soviet rubles tell us a great deal about Soviet objectives, policies and national priorities. Soviet rubles may be used to calculate the burden of defense on the economy and provide essential insight into the willingness of the Soviet leaders to build up their military power at the expense of economic growth and domestic consumption. But the estimates of Soviet defense expenditures in CIA constructs, mislabeled "rubles" by the admission of senior CIA analysts, may not be used to analyze Soviet policies, objectives and national priorities, or to calculate the burden on the Soviet economy. When CIA rubles are used for these purposes, the results are not only erroneous and misleading but also irrelevant.

The CIA's position on Soviet defense expenditures is confounded with a number of contradictions and conundrums, several of which surfaced in their testimony before this subcommittee:

One: The CIA says the rate of growth of its revised Soviet defense expenditures' estimates is 4 to 5 percent per annum since 1967. In fact, computed from the midpoint of the CIA's ruble data, the rate of growth for Soviet defense expenditures is 3.8 percent for the period 1967–1977. The high side of the CIA's ruble range is 4.2 percent per annum; the low side is 3.4 percent per annum, or 3 to 4 percent on the average, not 4 to 5 percent.

Two: The CIA testified to this subcommittee on November 1, 1979, that Soviet defense expenditures were 11 to 13 percent of GNP. In fact, by 1978 the CIA's estimate was down to about 6 to 8 percent of the Soviet GNP, at factor cost, by their own estimates just printed by the Joint Economic Committee of the Congress.

May I interpolate a comment, sir, that to interpret the data they have just published in the Joint Economic Committee as the equivalent of 6 to 8 percent GNP is, in my judgment, a generous interpretation of that data. This now puts the revised—doubled—CIA estimates at the same percent of GNP as the CIA claimed for the prior estimates.

Three: In his testimony on November 1, 1979, Mr. Burton explained the difference in the rate of growth between the CIA's estimates and my estimates of Soviet defense expenditures by alleging an inflation rate of 4 percent per annum in the prices of defense goods and services in the U.S.S.R. Actually, the difference in the growth rate of the two estimates of Soviet defense expenditures is 5 percent per annum. Published Western estimates of the inflation rate in the Soviet economy, mostly in food and other consumer goods, range from 1 to 3 percent per annum.

Two CIA analysts have cited 2 percent as the inflation rate. This is a long way from 4 to 5 percent inflation, particularly because 1 to 3 percent inflation in food and consumer goods would have a smaller effect on the defense budget than on the Soviet economy as a whole.

Four: In the area of weapons procurement, the difference between the growth of my estimates and the CIA estimate is over 10 percent per annum since 1960. Consequently, if Mr. Burton wants to explain the difference between my procurement estimates and the CIA's by inflation, he must demonstrate that the Soviets have experienced double-digit inflation in the prices of Soviet weapons over a period of two decades.

Five: To the best of my knowledge, the CIA has not documented a 4 to 5 percent inflation rate in the prices of defense goods and services, and, may I add, documented in a precise and serious manner: that is, a paper based on Soviet sources that is supported by traditional academic documentation and which takes all the evidence into account.

Neither has the CIA documented two decades of double-digit inflation in prices of Soviet weapons procurement after making due allowance for increases in weapon production costs as a result of increased complexity and technological innovation.

May I also interpolate to note the trends that were discussed at some length by Dr. Vorona earlier today.

No Soviet data known to me will support price inflation of these magnitudes either for defense goods and services generally or, most especially, for procurement.

Finally, we should remember three things about the CIA's direct costing methodology:

First: The CIA has not validated it by demonstrating that this methodology can estimate U.S. defense expenditures accurately.

Second: When the CIA acquired an independent check on its estimates for the year 1970—50 billion rubles—the CIA was estimating 24 billion rubles.

Third: After doubling its estimates, the CIA still fell 10 billion short of the second independent check of 58 billion rubles in 1972.

To explain the latter discrepancy by inflation, the CIA must demonstrate a 10-percent inflation rate for all defense goods and services in the years 1971–72.

That, sir, concludes my supplementary statement.

Senator WARNER. On behalf of the chairman, we are very grateful that you have taken the time to come back again and present your views. We will wait until the chairman returns before we ask the CIA to come forward; but I presume that you can arrange to wait for that period of time.

One of the problems we have in discussing issues of this complexity is to translate it into thoughts and expressions which the American public can grasp with a greater degree of ease.

Could you summarize for me in simpler terms what you see as the present trend of the growth of Soviet expenditures for their military purposes?

Mr. LEE. Well, sir, as I testified before, I see a steady, increasing upgrading of defense in Soviet national priorities, beginning in the year 1958. There was a bit of a slowdown, very briefly, in the years 1964–65. In those years the rate of growth in defense expenditures was not much different from the rate of growth of the economy as a whole.

But aside from those 2 years, defense has risen steadily in Soviet national priorities. They have gone from 8 or 9 percent of GNP in the late 1950's to at least 15 percent in 1975; and the data that they published indicate about 18 percent will be reached in 1980.

Procurement has grown more rapidly. Professor Rosefielde mentioned 11 to 13 percent. I consistently get rates of growth in procurement of 13 to 14 percent per annum for most of that period, on the average about that. It is an attempt, as far as I can see, to achieve their own self-stated goal of quantitative and qualitative superiority which they have said many times is their objective and which their literature indicates is set by the party and given to the military.

Now, as Dr. Vorona, I think, will agree, in many cases they do not have superiority yet, but they have been working toward it; and I think that is the essence of the trend.

Mr. Brezhnev lately has said superiority hasn't been their objective, but I think he is just trying to keep us from getting too excited about what is going on.

Senator WARNER. At what point, if they continue to grow here, do they really cause substantial harm to the overall economy?

Mr. LEE. Senator, I wish I could give you a more precise answer on that. They have already caused a great deal of harm to the Soviet economy by going as high as they have.

I agree with Professor Rosefielde that the rate of growth of the economy as a whole will not decline as drastically as some other people think; but I do believe that one of the principal reasons why the rate of growth has declined has been the increase in the share devoted to the military. Soviet data, for example, tell us that something like 40 to 50 percent of their labor force still works primarily by hand. In large part that is due to the diversion of resources from the production of machinery that people could use to produce things to the military establishment.

Senator WARNER. Thank you, Mr. Lee.

Ladies and gentlemen, I will recess the hearing until the return of the chairman. We will not resume before 11:15. Thank you very much.

[Brief recess.]

Senator BYRD. The committee will come to order.

I regret I had to leave, but I had a speech to give in the Senate. I appreciate you gentlemen bearing with me on that matter.

Let's get back to where we left off.

First let me say this. I think it is very important to our country to have a strong, efficient, and effective Central Intelligence Agency. I am one American who feels that the attacks on the CIA the last few years have gone beyond the bounds of justification. I think the attacks have hurt not only the CIA, but also our Nation as a whole. So my questions are not in any way meant to downgrade the CIA. As a matter of fact, I am a supporter of the CIA.

I think we must have a strong CIA. Over the past 14 years, events have proved that the CIA has, I am inclined to say, rather inconsistently underestimated the potential and power of the Soviet Union. But be that as it may, let's pick up where we left off last week.

I think it had been established that the Soviet Union is spending roughly 15 percent of its total military budget on personnel and personnel-related costs. That was the testimony of Mr. Lee, and as I recall, you, Mr. Burton, substantiated that figure.

STATEMENT OF DONALD BURTON, MILITARY ECONOMICS ANALYSIS CENTER, OFFICE OF STRATEGIC RESEARCH, CENTRAL INTELLIGENCE AGENCY, ACCOMPANIED BY JAMES BARRY, PAUL WELSH, DERK SWAIN, ROBERT ABBOTT, AND ROBERT ANDREWS

Mr. BURTON. Senator, I can speak to that. The number "15 percent" that we used was for uniformed personnel; it did not include civilian personnel; it did not include retirement pay. If we include both of those elements, our estimate becomes 20 percent; so that the U.S. share of 60 percent is comparable to a 20-percent share on the Soviet side.

Senator BYRD. Well that 20 percent figure is the one that I had in mind previously. I was surprised that the figure was estimated to be as low as 15 percent.

Mr. BURTON. Senator, that share of 20 percent is in rubles. If we were to calculate the share in dollars that share would be 50 percent.

Senator BYRD. Fifty? Are you contending that 50 percent of the total Soviet military budget goes for personnel and personnel-related cost?

Mr. BURTON. Only in dollar cost terms.

Senator BYRD. I don't know what you mean by that. Of the total amount of money, whatever type of money, is it 20 percent, or is it 50 percent?

Mr. BURTON. They spend 20 percent.

Senator BYRD. Now, that is good. Have we established that?

Mr. BURTON. Senator, the numbers that we gave you last week, the 15 percent, as I say, was simply uniformed military personnel.

Senator BYRD. The number you are giving me today; namely, 20 percent, is the percentage of the total defense budget which goes for personnel and personnel-related cost?

Mr. BURTON. Yes, and that is the number that is comparable with the 60 percent on the U.S. side.

Senator BYRD. Thank you. That is what I wanted to establish.

Let's go to the U.S. side. If we assume we have established the Soviet side at 20 percent, at what figure do you put the U.S. share of the total defense budget which goes to personnel and personnel-related cost?

Mr. BURTON. About 60 percent.

Senator BYRD. It seems to me that almost everyone agrees at this point.

Mr. BURTON. Yes, the number "30 percent" that we spoke of last week was for uniformed personnel alone on the U.S. side.

Senator BYRD. As you indicate in your statement today, that 30 percent figure leaves out a great deal in regard to personnel cost.

Mr. BURTON. Yes.

Senator BYRD. That figure was only half the total personnel costs?

Mr. BURTON. Yes.

Senator BYRD. Does the fact that the Soviet Union spends only 20 percent of its total military budget on personnel, while the United States spends 60 percent of its budget on personnel give Russia a dramatic advantage insofar as procurement of weapons systems and research and development are concerned.

Mr. BURTON. Not necessarily, Senator. The reason that the Soviet share is so low in rubles is that the relative pay of personnel is low.

Senator BYRD. Correct.

Mr. BURTON. But that is only half of the story. The other half is that the relative prices of machinery and procurement goods is very high in the Soviet Union.

Senator BYRD. It is very high compared to cost in the United States?

Mr. BURTON. The relationship between the prices of procurement and personnel in the Soviet Union is much higher than the relationship between the prices of procurement and personnel in the United States.

Senator WARNER. Could we put it in the simplest terms? Take an infantryman's rifle. I don't know what the current quotation is for our rifle. Does anyone know—for the purpose of discussion?

Mr. WELSH. I think it is a couple of hundred dollars.

Senator WARNER. For ease in mathematics, ours is $200. What would the cost of procuring a comparable weapon be in the Soviet Union?

Mr. BURTON. I don't have that number.

Senator WARNER. Maybe a percentage. I think the chairman has the question framed, but I am not sure I followed the answer. The chairman's thought was that you have this 20–60 comparison of costs and you clearly showed that the pay was much lower for the average Soviet military individual; but then my impression is that you were leading up to the conclusion that there is still a further disparity in the comparison by the fact that procurement costs are higher in the Soviet Union for comparable weaponry—guns, tanks, airplanes. I was trying to use an example of an infantryman's rifle that costs $200 in the United States.

What percentage would that same weapon cost in the Soviet Union? Is it $300? Is it 100 percent more, or what?

Mr. BURTON. I really don't have a number for that, Senator, but

the basic principle is that, in the Soviet Union, manpower is relatively cheap and machinery is relatively expensive.

Senator BYRD. A great deal of the cost of making machinery is in manpower. Russia has built a lot of submarines. Are you saying that a Russian submarine of the same size and tonnage as an American submarine would cost more than the American submarine?

Mr. BURTON. I would say that it takes more manpower in the Soviet Union to produce it than in the United States.

Senator BYRD. In the Soviet Union, the pay of an employee is only a fraction of what is paid to an American worker?

Mr. BURTON. Yes. The Soviet worker is both less productive and receives comparatively less pay.

Senator BYRD. Then what about a submarine? Both countries are building a lot of submarines. What I am trying to understand is how you can say that the costs are much higher.

Mr. BURTON. The cost of a Soviet submarine, relative to the cost of the crew that operates it, is much higher than the cost of the U.S. submarine relative to the cost of the crew that operates it.

Senator BYRD. I understand that point, but that was not the question. Let me state my view, and then you can correct it. My feeling is that it is less costly for the Soviets to build a submarine than it is for the United States to build a submarine.

Mr. SWAIN. Senator, let me try two different ways of answering your question, if I may: first in general terms and then specifically on the submarine that you just mentioned.

We, as you know, do our cost estimates in both dollars and in rubles. The dollars that we use when we are costing the Soviet defense activities are a hypothetical cost, that is, what would it cost to procure that equipment and pay those men in the United States using U.S. price structure.

Now, as Mr. Burton indicated a moment ago, if we apply these dollar costs, that is, U.S. prices and wages, to Soviet defense effort, personnel costs would be 50 percent of the equivalent Soviet budget in dollars and, therefore, the remaining procurement, R. & D., and so forth would be 50 percent. When we take those exact same activities—the same equipment, the same men, the same training, the same physical activities everything identical—and apply Soviet prices to them, the shares change dramatically. The 50 percent that was in dollars for personnel changes to 20 percent in rubles, reflecting that those items are relatively much cheaper in the Soviet Union; and the 50 percent that was for procurement and R. & D. in dollars climbs to 80 percent in rubles, reflecting the fact that the Soviet Union has to pay relatively more for those high technology goods than the United States does, compared to its labor force.

All of these are relative. There is no free exchange rate between the ruble and the dollar; we can't make that type of comparison. There is no free market——

Senator BYRD. If I understand it, you are making a comparison with the labor cost. All of us know that the Soviet labor costs are less; there is no doubt about that.

Mr. SWAIN. Yes; and relative to those labor costs, the material cost of complicated, sophisticated military equipment is much higher. Now, returning to your question of a particular submarine, if we are talking

in some common currency, whether it be rubles or dollars or pounds sterling or any common currency system, a given Soviet submarine will tend to be—and this is just a tendency—will tend to be less costly than a given U.S. submarine or airplane because the United States tends to build in more sophistication, more quality, and better performance than the Soviets choose to.

Senator WARNER. And I might add, more safety.

Mr. SWAIN. Yes; more quality control, more across the board, a more highly designed product, and it costs more.

Senator WARNER. Let me interrupt here, because I think it is important to put it in the record, Mr. Chairman, because I have some familiarity on the subject, not only safety but also living conditions for the individuals. We compromise quite a few dollars there.

Mr. SWAIN. Yes; that is correct.

Senator BYRD. I am not going to argue with the witnesses. I will just ask a question, and you answer it any way you wish.

Does the fact that 20 percent of the total Soviet defense budget goes for personnel and personnel-related costs and 60 percent of the total U.S. defense budget goes to personnel and personnel-related costs put the United States at a disadvantage in military expenditures?

Mr. BURTON. I think it is neutral, sir. I don't see that putting the United States at a disadvantage.

Senator BYRD. Well, I don't agree with you, but I am not going to argue the point. I just want to get your view. I want to understand the thinking of the CIA, and that is that although, as a percent figure, the United States spends three times as much for personnel and personnel-related cost, which means that our country can spend that much less for weapon systems and pocurement, that does not put us at a disadvantage.

Mr. SWAIN. Senator, I think we would agree that the Soviets can pay a lower price for their soldiers and sailors than the United States, but they must pay a higher price for material, for their equipment, and that is why it is difficult to say who has the advantage. We are at an advantage when procuring weapons for our military. The Soviets are at an advantage in buying people to serve in the military.

Senator BYRD. Let me see if I have this clear. We are at an advantage in buying weapon systems?

Mr. SWAIN. Yes.

Senator BYRD. Even though 60 percent of our defense budget goes for personnel?

Mr. SWAIN. If we are talking about the relative amount of the U.S. resources that would have to be spent for a particular weapons system, and comparing that to what the Soviets would have to spend for a comparable weapons system, the United States could get that weapons system more easily. We have an advantage over the Soviet Union in procuring high technology, complex weaponry.

Senator BYRD. I am glad you mentioned high technology complex weaponry. Earlier this morning, Dr. Vorona stated that it is highly accurate that the United States and the West are supplying critical technology on a large scale to the military of the Soviet Union. Do you agree?

Mr. BURTON. We agree with Dr. Vorona.

Senator BYRD. Will Russia have the capability to deploy nationwide an ABM system during the period 1980–85?

Mr. BURTON. We will provide that for the record for you, Senator. They certainly have the economic capability.

[The information follows:]

We observe no evidence that the Soviets are planning to abrogate the ABM Treaty and deploy a nationwide ABM system. [Deleted.] Nevertheless, should the Soviets choose [deleted] to deploy a nationwide ABM system, we estimate that by about [deleted] they could deploy [deleted] sites to defend [deleted.] A force this size, while a [deleted] undertaking, would not provide for an [deleted] defense of all of the U.S.S.R. If procured and operated in the United States, it would cost an estimated [deleted] excluding the cost of R.D.T. & E.

Senator BYRD. They have the economic capability?

Mr. BURTON. Yes.

Senator BYRD. Professor Rosefielde stated that over 4 million Soviet workers were forced laborers. How many forced laborers do you estimate are now in the Soviet work force?

Mr. BURTON. I don't have any estimate of that, Senator; but I am rather certain that none of them are in the defense industries.

Senator BYRD. Why do you say that?

Mr. BURTON. Because the Soviets pick and choose for their defense industries.

Senator BYRD. In other words, the Soviets take the best workers to go into the defense industries?

Mr. BURTON. Yes.

Senator BYRD. One of the areas in which we are reported to have a technological advantage is cruise missile engines and guidance technology. I have seen evidence that a critical engine component of the Detroit Allison engine for cruise missiles has been transferred to the Soviets. That statement has been made. Is that correct, to your knowledge?

Mr. BURTON. Senator, I don't think we have anyone here at the table who has expertise in that field. I don't know.

Senator BYRD. Does the CIA keep track of what technology that is transferred to the Soviet Union can be used from a military point of view?

Mr. BURTON. My own particular organization within the CIA does not, but there are people who do.

Senator BYRD. I want to thank you very much. I have a few more questions but, in the interest of time, I will ask you to answer them for the record.

Mr. BURTON. Yes, sir.

[See questions and answers, p. 122.]

Mr. BURTON. I wonder if I might complete the last part of our presentation? We were not able to finish it the last time.

Senator BYRD. Certainly.

Mr. BURTON. I believe this portion is perhaps the most important part of the presentation, and that is because it is about future prospects, what we think is going to happen with respect to Soviet procurement in the next decade.

Senator BYRD. That is very important.

Mr. BURTON. As you know, future procurement is rather closely related to Soviet economic prospects; and I believe that everyone

knows that the Soviet economy has been gradually slowing down over the last 30 years, and that we anticipate a further decline in that growth rate in the 1980's. Of course, we have to take this into account in any forecasts as to what is likely to happen to Soviet procurement.

Senator BYRD. What has been the growth rate in recent years?

Mr. BURTON. The growth rate fell from 6 percent per annum in the 1950's to 5 percent in the 1960's, to 4 percent in the 1970's, and we expect it to fall even lower in the 1980's.

Senator BYRD. About how low do you expect it to fall?

Mr. BURTON. I expect it will fall to perhaps 3 percent, and conceivably even lower.

In addition to the economic uncertainty, we have uncertainties regarding the SALT agreements and the impending change in the leadership.

Nonetheless, I believe that we already can see the bulk of the weapons production programs that will constitute the Soviet procurements well into the 1980's, probably into 1985. We also can see the weapons system in flight test or in trials and capital construction in the defense industries. We believe these indicators provide us the basis for a fairly confident projection of what the Soviet plans for that period.

We have closely monitored the activities at Soviet weapon production plants and design bureaus, and we see no evidence to date that any economic problems have altered their momentum. The Soviets now have about the same number of major weapon systems in production that they have maintained since 1970. Nearly three-fifths of these have been introduced in the last 5 years, and the production of most of these will continue well into the 1980's.

Senator BYRD. Would you state that again?

Mr. BURTON. The Soviets now have about the same number of major weapons systems in production that they have maintained since 1970. Nearly three-fifths of these have been introduced in the last 5 years.

Senator BYRD. That is the point I am interested in. In other words, 60 percent of the major weapons systems currently in production have been introduced since SALT I?

Mr. BURTON. Yes.

Senator BYRD. What about the other 40 percent? Have some or all been introduced since SALT I?

Mr. BURTON. Some since SALT I and some before SALT I; but most of these will still be in production in the 1980's because these weapon programs, as you well know, take a long time to execute.

We also have ample evidence of the Soviet weapons test facilities, and this indicates that the number of Soviet strategic and general purpose weapons in flight test or on trials is also about the same as the average since 1970. Soviet design bureaus also appear to be maintaining a high level of activity in the development of follow-on weapons.

These consistently high levels of activity have important implications for growth in defense spending because new weapons have tended to be more costly than their predecessors. The Soviets are experiencing the same kinds of cost escalation for follow-on weapon systems that we are in the United States. This is especially true of sophisticated high technology systems such as follow-on ballistic missiles, high performance aircraft, and advanced naval ships, which the Soviets now have under development.

Another important point is that, historically, we have always observed a very strong correlation between the completion of capital construction in the defense industries and subsequent upswings in the rate of growth of defense spending. We are watching this very closely and the amount and type of construction now underway indicates that there will be another cyclical upswing in defense spending likely in the early to mid-1980's as this new industrial capacity comes onstream.

All of this evidence strongly suggests that total Soviet defense spending, and spending for military procurement in particular will continue to increase in real terms at least through 1985. The programs we have already identified imply a rate of increase in constant ruble outlays for military procurement at or near the long-term rate that we have observed for the last 15 years, that is 4 to 5 percent per year. In dollars, this implies a continuation of the long-term rate of increase of 3 to 4 percent per year.

The evidence indicates further that it is force modernization rather than expansion that will be the principal determinant of Soviet defense procurement in the 1980's. We expect only slight increases in the overall size of Soviet forces, and even decreases in some areas. We project a continuing across-the-board improvement in force capabilities as new and costly weapons systems are introduced. These will include new land- and sea-based strategic missiles, tactical and air defense aircraft and missiles, ground forces armaments, and general purpose naval ships.

If economic difficulties continue on into the late 1980's, they would give the Soviet leaders a greater incentive to moderate the rate of growth in defense spending. We think, however, that any moderation would be only at the margin.

Finally, the decisions that they make from now on regarding new military programs and new weapon developments which could affect defense spending in the late 1980's may reflect greater concern for the military drain on the economy. But we think it is unlikely that economic problems will force the Soviets to reverse their commitment to continuing improvement in their military forces.

Senator, I think that is the bottom line message that we would like to present today.

Senator BYRD. Thank you.

You anticipate then, a continued increase in Soviet military procurement through 1985 and probably through the entire 1980's.

Mr. BURTON. Yes.

Senator BYRD. And you expect an annual real growth in Soviet military spending to be between 4 and 5 percent?

Mr. BURTON. Yes.

Senator BYRD. One of the witnesses testified earlier that the SS–17, the SS–18, and the SS–19 were each deployed after the signing of SALT I. Do you agree with that?

Mr. BURTON. We agree with that, sir.

Senator BYRD. With regard to cost escalation in this country, most of that escalation would come from wage increases; wouldn't you agree? And the escalation would be reflected in the products, whether it be a submarine or a gun or a tank or whatever?

Mr. BURTON. No, sir; that is not the kind of cost escalation that we are talking about. We are talking about the follow-on weapons being

substantially more capable and therefore more costly in real terms. This is after extracting price inflation out of that equation.

Senator BYRD. Well, thank you very much.

I thank all of you gentlemen.

I think that will conclude the hearing.

I do have a few questions which I ask you to answer for the record.

[The questions with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR HARRY F. BYRD, JR., ANSWERS SUPPLIED BY DONALD BURTON

Senator BYRD. What percentage increase in real terms do you expect in the Soviet gross national product in the period 1980 through 1985?

Answer. Based on evidence currently available, we expect Soviet GNP to grow at about 2 to 3 percent from now through about 1982. After then, we believe the rate of growth will fall to 1 to 2 percent or lower.

Senator BYRD. What percentage of Soviet gross national product do you believe will be devoted to defense, in the broadest sense of the term, during the period 1980 through 1985?

Answer. We estimate that defense spending, as defense is defined in the United States, currently consumes 11–12 percent of Soviet GNP. We also estimate that, if the Soviets carry through with current programs, defense spending will continue to grow at or near the long-term average rate of 4–5 percent a year. If Soviet economic growth slows, as we expect, then the defense share could reach some 13–15 percent by 1985.

For a broader Soviet definition of defense expenditures, which includes spending for internal security forces, military reserves of material, foreign military grants-in-aid, civil defense, and space programs carried out by the military, we believe that the defense share of Soviet GNP is currently 12–13 percent and that it could reach about 14–16 percent of GNP by 1985.

Senator BYRD. In your judgment, to what extent could the Soviet Union increase that percentage without causing a decrease in the predicted growth in Soviet gross national product that you have estimated.

Answer. Our current projections of Soviet economic growth are based on an assumed 4 to 5 percent annual growth in defense spending through 1985. Our analysis indicates that the rate of growth would have to be about one percentage point higher before there would be a measurable reduction in our projection of the overall growth of the economy. Under these conditions, the share of Soviet GNP allocated to defense in 1985 (as defense is defined in the United States) would be about a percentage point higher than we are now forecasting—that is some 14 to 16 percent.

Senator BYRD. What percentage of Russian machinery output during the period 1980 through 1985 do you estimate will be used to produce consumer durables? What percentage to manufacture producer durables? What percentage to produce military durables?

Answer. Our estimate of Soviet defense spending include direct defense expenditures (i.e., military purchases of weapons, equipment and services), and thus they indirectly capture the value of the machinery and other inputs used to produce weapons and equipment (i.e., in the prices paid by the military at the time of purchase). Consequently, we do not make separate estimates of the value of the machinery and other inputs to the weapons production process. We would note, however, that Soviet statistics indicate that during the current five year plan (1976–80) producer goods of all types (i.e., for the production of consumer, producer, and military durables) have accounted for about half of the machine building and metal working output produced for final demand. Soviet statistics on planned machine building and metal working output for the 1981–85 plan are not yet available.

Senator BYRD. Of military durables, what percentage is currently being acquired for naval systems? For strategic missiles, including medium-range ballistic missiles, intermediate-range ballistic missiles, and strategic sea-launched cruise missiles? What percentage for ground warfare systems? For air defense? For frontal aviation? For long-range aviation? For naval aviation? And for military transport aviation?

Answer. The requested shares of total Soviet military procurement expenditures are given below. We have less confidence in our estimates of defense ex-

penditures and costs at these lower levels of aggregation than in our estimates for total defense activities. Consequently, the percentages should be used only as rough indicators of each category's share of the Soviet effort.

[Table deleted.]

Senator BYRD. In reviewing estimates for past years and in assessing future probabilities, do you see any trends in the allocation of Soviet defense spending which should be brought to the attention of the Committee? For example, is there a trend for greater acquisition of military durables which support strategic defenses as opposed to offensive systems? Do you see that trend or any other trend of significant? How about trends in procuring systems for strategic anti-submarine warfare?

Answer. Since at least 1965, Soviet defense expenditures in constant 1970 rubles have increased at a real average annual rate of 4 to 5 percent. Evidence indicates that, if the Soviets do not alter their current plans, defense spending will continue to grow over the next five years at or near the rate of the past 15 years. This increase in Soviet expenditures on defense results from both a substantial expansion of Soviet military forces and an across-the-board improvement in the quality of weapons and equipment. The most significant increases in force size are taking place in Frontal Aviation, Ground Forces—especially those along the Sino-Soviet border—and in strategic missile forces.

The most significant trend in the distribution of defense spending through the mid-1980's is likely to be in strategic defense as the Soviets attempt to shore up their defenses against low-altitude bomber and cruise missile attack. Procurement spending for new and modified strategic interceptor aircraft and a new strategic SAM probably will cause National Air Defense Forces to take an increasing share of investment and operating expenditures in the early 1980's.

Within the general purpose naval forces, there probably will continue to be a major emphasis on improving ASW capabilities. In the 1980's, the Soviets will probably increase their emphasis on nuclear powered attack submarines and they may also introduce a new long-range ASW aircraft.

For a more detailed presentation of Soviet defense spending trends, see "Soviet Spending for Defense: Trends Since 1965 and the Outlook for the 1980s," SR 79-10147, October 1979, Secret.

Senator BYRD. Have manpower costs in Russia risen at a rate comparable to the rate of increase in the United States? What increase, if any, in real terms for military personnel costs have been experienced in Russia in the past five years?

Answer. U.S. and Soviet military personnel costs can be compared in constant or current prices. Cost estimates expressed in constant, or "real," terms reflect only changes in force size and structure. Estimates expressed in current prices show trends in force size and structure plus the effects of changes in pay and the costs of goods and services provided to military personnel.

Measured in constant prices, uniformed personnel costs for the United States have declined nearly 40 percent since 1970 and about 15 percent over the past five years. Estimated Soviet uniformed personnel costs, on the other hand, have risen more than 10 percent since 1970 and nearly 5 percent during the past five years. These changes correspond directly to variations in the manning levels and personnel structures of both forces.

To shift from constant to current personnel cost estimates, annual increases in the per-serviceman costs of pay and direct support must be incorporated in the comparisons. According to US Department of Defense data, the annual costs of an average US serviceman rose 110 percent between 1970 and 1979. By combining information on Soviet military pay raises and analyzing increases in the wholesale costs of the goods and services provided to uniformed Soviet personnel, we estimate that the average cost of Soviet servicemen rose almost 20 percent during the same time. The difference between the rate of growth of per-capita US and Soviet uniformed personnel costs reflects the relative infrequency of Soviet military pay raises and the lower rates of inflation in the USSR's controlled economy.

When these increases in per-capita costs are included in the calculation of total outlays for uniformed personnel, total US military manpower outlays have risen approximately 40 percent since 1970 and 20 percent over the last five years. Using the same concept, we estimate that aggregate Soviet outlays—in current terms—for uniformed military personnel have risen about 30 percent since 1970 and 10 percent over the last five years.

Senator BYRD. What percentage of the Russian industrial work force do you estimate to be engaged in defense industry? How does that figure compare

with the percentage of the United States industrial work force engaged in defense production?

Answer. We do not have estimates of the number of Soviet workers in the defense industries because there are no reliable Soviet defense industrial statistics available. The secrecy surrounding the Soviet defense industries and their relation to the civilian economy make this a particularly difficult area in which to obtain information.

Senator BYRD. What percentage of the Soviet defense dollar is devoted to acquisition of military durables for use in outer space? In general terms, in your professional judgment, to what extent or degree is the Soviet space program designed for military purposes and uses, and how does that degree compare with, in general terms, the military applications of the United States space program?

Answer. [Deleted.]

The Soviets currently launch between 90 and 100 space vehicles annually and maintain about 65 to 110 active satellites in orbit at any one time. In the USSR the SRF conducts all space programs. We allocate these programs to military and civilian categories based on the way DOD and NASA would divide them if they were conducted in the United States. Under this definition [deleted].

We are not in a position to comment authoritatively on the military applications of the United States space program.

Senator BYRD. One of the most notable elements in recent Russian defense spending policy has been an apparent emphasis on acquisition of surface ships and submarines. During the past five years, has there been a trend toward greater acquisition of surface ships in percentage terms than submarines? Do you expect this trend to continue during the period 1980 through 1985?

Answer. [Deleted.]

Senator BYRD. Media reports have indicated that Russia has developed more than one type of new model Soviet cruiser. Can you add to these reports? What percentage of current year procurement costs in dollars and rubles do you estimate are being expended to acquire new model Soviet cruisers?

Answer. [Deleted.]

The Soviet Union began building [deleted] new classes of cruisers during the 1974–1979 period. These ships will begin entering service during [deleted]. One class has been designated a [deleted] and represents the Soviet Navy's [deleted] surface combatants. Estimated 1979 procurement costs for these classes measured in either rubles or dollars represent roughly [deleted] of general purpose navy procurement, and about [deleted] of total defense procurement.

Senator BYRD. There have been extensive media reports of Soviet construction of nuclear aircraft carriers. What percentage of current year procurement costs in dollars and in rubles do you estimate are being expended to acquire nuclear carriers?

Answer. [Deleted.]

Senator BYRD. In previous testimony before the Subcommittee on Priorities and Economy in Government of the Joint Economic Committee, the Central Intelligence Agency has indicated that 50 percent of Russian defense spending goes to investment, that is, procurement and military construction. What percentage of investment is military procurement? What is the share of total military spending devoted to military procurement? What was the ruble cost and dollar cost for weapons procurement during 1978? What is the projected ruble cost and the projected dollar cost of weapons procurement during 1979 and 1980? What is your estimate of the ruble and dollar cost of weapons procurement in the period of the next Russian five-year plan, that is, 1981 through 1985?

Answer. Estimated defense spending can be calculated in either dollars or rubles. Rubles should be used when measuring the Soviet commitment of resources to its military forecs. Dollars should be used when comparing the magnitude of Soviet activities with U.S. activities.

For calendar year 1979 procurement was about [deleted] percent of investment when measured in either rubles or dollars. Procurement was about [deleted] percent of total spending when measured in rubles and [deleted] percent in dollars. The difference in percentage reflects the relatively higher costs to the Soviets of procuring weapons systems.

[Table deleted.]

We expect procurement will continue to grow at the same rates for the next five year plan as we observed in the 1970s.

Senator BYRD. Your figures indicate that investment is an extremely constant share of total military spending in Russia. Does this seem reasonable?

Answer. The phenomenona of fairly constant shares of major resource categories in total allocations is consistent with Soviet practice in running a planned economy. Our knowledge of Soviet planning techniques indicates that the resource pie is re-cut each year proceeding from, and not deviating very greatly from, the proportions of the preceding year. This is done primarily so as not to disrupt the complex web of production-consumption relationships or to create bureaucratic antagonisms among the entrenched institutional claimants on the national product. (To our knowledge the idea of zero-base budgeting has never been raised in the USSR.) Such a pattern of allocation fits with the declared planning principle of "proportional and balanced development" of the economy which specifically seeks to avoid the types of fluctuations attributed to a capitalist market economy.

Published Soviet statistics on investment in the economy also show a fairly stable pattern. For example, available data on the share of centralized capital investment in total expenditures of the state budget for 1966–1976, expressed in current prices, show that the average share for the period was 19.5 percent with fluctuations in individual years ranging from a high of 21.6 percent to a low of 17.8 percent. Soviet statistics on total capital investment (i.e., those financed from both budgetary and nonbudgetary sources), expressed in Soviet-style constant or "comparable" prices, indicate that within the total, the various claimants—industry, agriculture, housing construction, etc.—tend to maintain very stable shares for long periods, as shown by the example of industry below:

	Average annual			Annual				
	1956–60	1961–65	1966–70	1970	1971	1972	1973	19 7
Share of industry in total capital investments (percent)	36.2	36.9	35.6	35.7	35.1	35.1	35.4	35.6

Senator Byrd. Please provide your estimate of Soviet military procurement back through 1960. Also, please provide your estimates on total Russian military expenditures back through 1960. What is the percentage degree of variation in estimates between years; that is, what is the greatest percentage change over the past twenty years, and what is the least percentage change over that period?

Answer. Our most recent estimate of Soviet spending for defense deals with the period since 1965. We have no estimates of Soviet spending for military procurement prior to 1965. Since 1965, Soviet spending for military procurement has grown at an average of over 4–5 percent a year or about the same average rate as Soviet spending for defense in general. Because our estimates of year to year changes are highly sensitive to assumptions about the phasing of expenditures for major weapons programs, we are less confident in them than in our estimates of the overall trend. We have, however, noted that Soviet spending for military procurement has grown in cyclical fashion, reflecting the production and deployment cycles for strategic missiles, fighter aircraft, and ballistic missile submarines. Annual growth in spending for military procurement was higher than average in the late 1960s when the production of third generation strategic missiles and of Y-class submarines was in full swing and the Moscow ABM system and new tactical aircraft were being deployed. The early 1970s, in contrast, were a period of transition, when production of third generation strategic missiles and Y-class submarines was winding down and production of follow-on systems was just beginning. As a result, the annual growth in spending for military procurement was lower than average. Thereafter, with the production of fourth-generation strategic missiles, D-class submarines, and high performance aircraft, growth in Soviet spending for military procurement again rose above its long-term average rate before falling slightly again in the late 1970s.

Senator Byrd. What is the difference between your current estimates of military procurement and your prior estimates of military procurement made before the 1976 revision?

Answer. For the year 1970 our current estimate of Soviet spending in rubles for military procurement is about 125 percent greater than we judged it to be in the estimates prepared in 1974. Similar changes were made for other years. These increases reflect a change in our understanding of the prices of Soviet weapons and military equipment. Our estimates of the physical goods procured

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and of the dollar costs of those goods, however, were essentially unchanged by the revision.

Senator BYRD. Since 1975, using, first, ruble cost and, second, dollar cost, what is your estimate of the rate of growth in military procurement? What rate of growth do you estimate for the period 1980 through 1985? What rate of growth do you estimate has occurred since 1975 in total military spending, again both in dollar cost and in ruble cost? What rate of growth do you estimate in total military spending during the period 1980 thorugh 1985, again in dollar cost and in ruble cost?

Answer. The following table shows average annual growth rate estimates for total military costs and for procurement. Growth rates are given for both dollar and ruble costs.

[Table deleted.]

As you can see from the table, the ruble growth rates are higher than the corresponding dollar growth rates. This occurs because the slower growing elements (manpower, for instance) of Soviet defense activities tend to be more costly in dollar terms while in the ruble estimate, the faster growing elements (advanced weapons systems) are more costly.

Senator BYRD. In 1970 and 1972, specific known fixes were obtained on actual Soviet military spending. These fixes caused your Agency to change its estimate for 1970 from 24 billion rubles to 50 billion rubles for Soviet military spending in 1970 and to revise all other estimates, including the estimate for 1972 which you revised to 58 billion rubles. In doubling your estimates, did you learn anything about your method of obtaining the estimates? In other words, since you were wrong, did you change your method or did you simply change arbitrarily the conversion ratio for translating dollar costs to ruble costs?

Answer. In 1976, the CIA published an estimate of Soviet ruble spending for defense which was about twice as high as the estimate made two years earlier. The principal reason for the change was new information indicating that ruble prices of Soviet military hardware were substantially higher than had previously been thought. We did not arbitrarily change the conversion factors we use to translate dollar costs to ruble terms based on "specific fixes" on actual spending. Rather, nearly all ruble-dollar conversion ratios were changed in differing amounts as a result of the new detailed information about higher ruble prices for specific military products. We have explained this procedure in several publications and in testimony before the Congress.

Senator BYRD. The basic approach taken by the Central Intelligence Agency, as I understand it, in estimating Soviet military expenditures for investment, pay, maintenance, and operations is to count the number of weapons systems involved, to compute the dollar cost of acquiring similar systems within the United States, and then, to convert that dollar cost into a ruble cost in Russia. This approach has been criticized because (1) it is difficult to count all systems using National Technical Means of Collection, (2) our knowledge of characteristics of Soviet military systems is incomplete and ranges from no knowledge to perfect knowledge, depending on the systems involved, (3) the conversion of dollar costs into ruble costs is based on insufficient knowledge of Russian prices and costs, and (4) our estimates are not checked against public Russian statistics. Putting aside these criticisms, have you validated your method of costing against U.S. costs and by checking the answer obtained for U.S. costs against figures you know to be correct? In other words, have you validated your method against our own expenditures?

Answer. We do not agree with the criticisms of our direct costing estimates. Although we agree that it is difficult (in fact, impossible) to identify all Soviet weapon systems and determine their characteristics by national technical means of verification, we believe that the U.S. Intelligence Community's collection effort is sufficient to support the stated accuracy of our defense spending estimates. Also, we currently have an excellent data base on Soviet prices of defense goods, and we carefully monitor Soviet data and check our estimates against Soviet statistics. We disagree with some of our critics on the interpretation of Soviet statistics, but not on the desirability of making use of them.

As noted in the preamble to your question, there are two basic parts of our estimates of Soviet spending for defense investment and operations: the unit costs and the quantities. Our estimates of the unit dollar costs are based on costing models that have been developed from U.S. experience and in some instances on the use of U.S. data. As a result, our estimates of unit costs are regularly validated by comparison with actual U.S. costs. However, estimating

the quantities of U.S. defense procurement, construction, and manpower by national technical means of verification is impractical because of resource constraints.

Senator BYRD. You have stated that you are confident that your approach to estimating Russian costs is accurate in spite of the criticisms I have outlined. But weren't you equally confident in your earlier estimates, which turned out to be wrong? In other words, since you have already doubled your estimate once in 1976, why should the Congress have any confidence in your present estimate?

Answer. As explained in answer to question 18, the doubling of our estimate did not result from any single piece of information but rather from an accumulation of evidence of various types which persuaded us that many of the ruble price factors which we applied to Soviet defense activities were incorrect.

It was largely because of the new data that we were collecting and our improved understanding of Soviet prices and costs that we were able to evaluate the 1975 information that indicated total Soviet spending for defense was much higher than we were then estimating. In sum, the period from 1974 to 1976 was a time in which our understanding of Soviet military prices and price changes advanced very greatly. It is because of this improved understanding and of the growing body of price data that we have collected since 1976 that our confidence in our estimates of Soviet defense spending has increased.

Senator BYRD. It seems to me that the approach used by your Agency has so many assumptions at so many levels that it could produce significant error in the final figures. But focusing on one particular step in the process, that is, the conversion from dollar prices to ruble prices, how many Russian prices do you actually know in relation to the total number of prices involved in military hardware procurement? How many prices of entire systems do you have? How many prices of major parts of systems (for example, a missile in an air defense system) do you have? How many individual component prices do you have? Have you ever gone through U.S. procurement accounts to determine the number of prices involved in procuring systems for our own military? How many prices do you estimate to be involved in total procurement for the Soviet military? How can you convert dollar costs into ruble costs when the number of prices you know in relation to the total number of prices apparently amounts to only a small percentage of the total number of prices involved?

Answer. In our latest ruble estimate, about half of total Soviet defense spending was estimated directly in rubles. For the remaining components of defense spending, we first estimated what it would cost to carry out the Soviet activities in the United States and then converted these dollar costs to ruble terms. The conversion factors are based on samples of prices of Soviet military equipment and activities. The reliability of our conversion factors depends, of course, on the accuracy of the price information and on the extent to which the sample reflects overall price relationships for various categories of defense products. We thus make a concerted effort to use the most accurate and reliable price information. For your information, our data base contains thousands of reported prices for Soviet military equipment and components. We examine these reports closely and select for our analysis only data from the most credible sources. Moreover, we require additional information on production and technical characteristics to support our analysis. As a result, we use only a fraction of our houldings to calculate conversion ratios, but because of our selectivity we are confident that the prices we use are quite accurate.

On balance, we believe that our price sample is an adequate reflection of the prices for the major categories of Soviet defense activities. [Deleted.]

In sum, we acknowledge that we do not have actual Soviet prices for all items of equipment, but we do have prices on a significant sample and believe that the statistical combination of this sample information and that of our detailed dollar costs results in estimates of overall ruble costs that are scientifically valid.

Senator BYRD. The Agency, in testimony before the Subcommittee on Priorities and Economy in Government of the Joint Economic Committee, testified that, "Unfortunately, analysis of Soviet statistical data yields results that are much less reliable and informative than some of our critics have claimed." How did estimates made by those critics and based on Soviet data compare with the known base point fixes obtained for the years 1970 and 1972? How did your own figures compare against those known base point years?

Answer. [Deleted.]

Since 1974, Mr. William T. Lee, a private consultant and Soviet defense analyst, has estimated that Soviet defense spending in current prices was about 43–49 billion rubles in 1970 and 51–58 billion rubles in 1972. [Deleted.] Mr. Lee bases his estimates on published Soviet statistics but adjusts these statistics in a number of ways which we believe to be unsubstantiated. His estimates of Soviet spending for military hardware, for example, are derived by subtracting civilian output from the gross value of output (GVO) of the machine building and metal working (MBMW) industries. But Mr. Lee's statistics on MBMW GVO are 11–12 percent higher than those published by the Soviets for 1970 and 1972. Lee maintains that this adjustment is necessary to correct for an alleged change in Soviet reporting of industrial output. But Soviet sources indicate that the change which Lee alleges to have occurred did not take place. Mr. Lee's adjustment, which we believe to be unsubstantiated by the Soviet data, results in increasing his estimates of Soviet spending for military hardware by about 6 billion rubles for 1970 and about 7 billion rubles for 1972. If these overstatements of the military hardware estimates are subtracted from Mr. Lee's estimates of total Soviet spending for defense, then the latter fall to about 37–43 billion rubles for 1970 and about 44–51 billion rubles for 1972. [Deleted.]

[Deleted.] Our current estimates of Soviet defense spending for [deleted] 1970, and 1972 are as follows:

Billion Rubles: [deleted]; 1970, 45–50; 1972, 48–53.

These estimates are in constant 1970 prices and reflect a definition of defense spending broader than that used in U.S. budgetary accounts, but one which we believe the Soviets may employ. [Deleted.]

Senator Byrd. In considering weapons procurement only, would you describe the distribution and rates of growth by mission, that is, strategic offense, strategic defense, and general purpose? Please also provide the same information with respect to distribution and rates of growth in weapons procurement by branch of service.

Answer. Table I gives the distribution of Soviet procurement and the average annual growth rates for selected Defense Planning and Programming Categories (DPPC) missions. Because these are U.S. defined missions we have made these calculations in dollars. The category "other strategic" includes control and surveillance and nuclear weapons. Peripheral attack forces are included in strategic offense.

TABLE I.—ESTIMATED SOVIET DOLLAR PROCUREMENT COSTS BY DPPC MISSION

[In percent]

	Distribution (cumulative 1970–79)	Average annual growth (1970–79)
Strategic offense	18	5
Strategic defense	9	−2
Other strategic	4	8
General purpose	58	4
Support	11	5

Table II gives the distribution of Soviet procurement and the average annual growth rate by Soviet services. Because we are analyzing actual Soviet Services we have made these calculations in rubles.

[Table deleted.]

Senator Byrd. On August 23, the Washington Post carried a story with the headline "Soviets Said Choosing Lasers as Next Step in Arms Race." The story was based on a study by the Rand Corporation for the Air Force which says lasers are receiving the same high level political support in the complex Soviet weapons development system that earlier was given to nuclear weapons and Intercontinental Ballistic Missiles. What percentage of Soviet military investment will go in the current year to procurement of military durables associated with laser weaponry? What percentage of R.D.T.&E. do you estimate is devoted to laser weapons research and development? How does that percentage translate in terms of ruble costs and dollar costs?

Answer. [Deleted.] We estimate that the procurement of laser weaponry currently constitutes an insignificant percentage of Soviet military investment. [Deleted.] It is presently not possible to translate the above mentioned activities into a useful estimate of laser research spending. We do believe, however, that laser weapons R.D.T.&E. to date constitute only a small percentage of total Soviet spending for military R.D.T.&E.

Senator BYRD. What percentage of Soviet military construction costs go for facilities constructed outside the territorial limits of the Soviet Union? What is your estimate of the ruble costs and dollar costs of such external military construction?

Answer. We estimate that no more than one-fifth of the U.S.S.R.'s present military construction budget is spent on projects outside of the Soviet Union. The bulk of the Soviet military facilities built in foreign countries have been in Eastern Europe—primarily East Germany—and Mongolia. Construction activities in Eastern Europe have reflected the gradual renovation of a large stock of structures of World War II vintage, incremental expansion of ground and air force units, the introduction of new weapons with additional maintenance and storage requirements, and general expansion of the Soviet logistic system. Construction in Mongolia has accompanied the buildup of ground and air force units along the entire Sino-Soviet border area. Soviet military construction in Cuba, Somalia, and other non-contiguous countries has been sporadic and, from an overall cost standpoint, inconsequential.

Senator BYRD. Dr. Vorona stated in his testimony on November 8 that it is "highly accurate" to say that the United States and the West are supplying critical technology on a large scale to the military of the Soviet Union. Do you agree? If you disagree, what is the basis for your disagreement?

Answer. We are unable to support Dr. Vorona's specific statement.

[Deleted.]

Senator BYRD. One of the areas in which we are reported to have a technological advantage is cruise missile engine and guidance technology. I have seen public evidence that a critical engine technology (C–20–B component of Detroit Diesel Allison engine) for cruise missiles has been transferred to the Soviets. What evidence do you have to refute or substantiate that charge?

Answer. The C–20–B is not a cruise missile engine or engine component but rather is a 1974 version of the Detroit Diesel Allison Model 250 turboshaft helicopter engine, which was first marketed in 1962.

The technology found in this engine has been transferred to an Eastern bloc country. There is an approved agreement between the Spitfire Helicopter Company of Media, Pennsylvania and the PZL-WSK-Swidnik Polish Aircraft Company for Spitfire to market in the West a version of the Polish MI–2 light utility helicopter with a C–20–B engine.

The MI–2, an original Soviet design, is now produced only by Poland. Although powered by the Allison C–20–B engine, there would not be greatly improved performance over the Soviet-designed GT–350 engine that the Poles currently install on the helicopter. However, the marketability of the MI–2 in Western countries is probably enhanced by incorporating the U.S. engine.

There is no technology in the C–20–B that is directly related to cruise missile engines. Furthermore, Allison is not involved in the cruise missile engine program. However, the C–20–B is physically in the size range of a cruise missile engine and some components may be of limited use to the Soviets. The engineering necessary to change the C–20–B from a turboshaft engine optimized for light helicopter applications to a turbojet optimized for a high-speed cruise operation would be very extensive and extremely costly.

Senator BYRD. Professor Rosefielde stated the view that over 4,000,000 Soviet workers were forced labor. How many forced laborers do you estimate are now in the Soviet work force? How many of these work in defense industries?

Answer. The U.S.S.R.'s penal system is based on the principle of rehabilitation through labor. Probably more than 90 percent of all criminal sentences in the Soviet Union involve correctional labor. This labor takes many forms, however, ranging from continuation at previous jobs with reduced pay (essentially a fine) to confinement in forced labor camps.

We estimate that perhaps as many as 5 million Soviet citizens may now be undergoing penal correction in the form of forced labor. Of these, roughly a third are under confinement, mostly in forced labor camps. The remainder are not confined but are required to perform forced labor, often on major civilian construction projects.

We believe that few, if any, of these forced laborers are employed directly by Soviet defense industries. The Soviets consider most positions in these industries to be sensitive and require security clearances for them. Our information indicates that forced laborers are engaged primarily in civilian manufacturing activities, timber production, construction projects, and mining enterprises.

Senator BYRD. Are your "constant 1970 rubles" for procurement constructed in a manner comparable to Soviet constant 1970 rubles? Suppose we could see

the ruble figures on Brezhnev's desk. How confident are you that those figures would be the same or very close to your estimate?

Answer. Western analysts view Soviet economic performance in terms of our own concepts, not the Marxist-Leninist concepts of the USSR. Our "constant 1970 ruble" estimates for Soviet military procurement are constructed in a manner consistent with this view. They are intended to measure real changes in defense activities, excluding the effect of inflation. This practice is consistent with the majority of Western scholarly opinion that holds that Soviet data are unreliable for economic analysis because they differ in concept from Western data and because they use inflated prices. As a result, most Western scholars agree that in order to gain an accurate picture of real Soviet economic performance it is necessary to make independent estimates. We do this for the Soviet economy as a whole and for its major components, including defense.

The Soviets measure economic activity in terms of their own concepts, which are rejected by most Western analysts. The Soviets' ruble data on military procurement are consistent with their own concepts and probably differ from ours in two ways. First, the definition of defense activities and the categories of expenditures are different. Second, Soviet planners would use a different price concept. The Soviets present their economic data either in current prices or in what they call "comparable prices" for a given year. The Soviets' comparable prices are intended to show trends in real terms but they are constructed with a methodology which differs from the Western market economy technique. Most Western experts believe "comparable prices" result in an inflated picture of economic growth.

Thus, the perceptions the Soviets draw from their own data may differ from our analysis in ways that are difficult for us to determine. We do know, however, that although their measures of overall economic performance differ from ours in concept and price base, they too perceive a slowdown in their economy. Similarly, although Soviet perceptions of the economic impact and priorities of their defense programs probably differ from ours in detail, their planners clearly are aware that the defense effort has had a substantial effect on their economy and that this effect is likely to increase.

Senator Byrd. Last week, you stated that you have high confidence in your current estimates which have nearly the same growth rate as your prior estimates. You expressed similar confidence in the latter before you had to double your estimates. How could you double your estimates with so little change in the growth rate, and how is your confidence any more justified now than before you doubled your estimates?

Answer. The estimate of the rate of growth in Soviet defense spending made after we became aware that ruble prices of Soviet military equipment were higher than previously believed is different from that of our previous estimates. At the time our new estimates were published we stated that our prior estimates placed the long-run growth rate in rubles at about 3 percent. As a result of incorporating the new ruble price information in our analysis, the growth rate estimate was revised to 4 to 5 percent. Our analysis of the new ruble prices of military hardware indicated that high-technology programs—the most rapidly growing component of Soviet military expenditures—are much more costly to the Soviets than we previously believed and thus the new estimates show more rapid growth.

Our response to your question about our confidence in the estimates is essentially the same as that given to questions 18 and 20; i.e., because of an accumulation of evidence of various types, our understanding of Soviet military prices and price changes has advanced very greatly since the early seventies.

Senator Byrd. Computed directly from your ruble estimates, the rate of growth in Soviet defense expenditures falls in the range of 3.4 percent to 4.2 percent per annum, midpoint 3.8 percent for the period 1967–1977. Yet you have testified that the growth rate is 4–5 percent per annum. How do you explain this discrepancy?

Answer. The computations given in the question are incorrect. In our estimates published in 1978 we assessed Soviet defense expenditures for 1967 at 35 to 40 billion 1970 rubles and for 1977 at 53 to 58 billion. Comparing the midpoints of these estimates (37.5 and 55.5 billion) results in an average annual rate of growth of 4.0 percent. Our analysis of uncertainties in our methodologies indicates that, if the computed growth rate is in error, it is likely to be low rather than high. Therefore, we express our estimate as a range, 4 to 5 percent, to highlight the uncertainty.

Senator Byrd. You have stated that defense is a consistent 11–13 percent of Soviet GNP, yet you have published data for 1978 that puts defense at about

6.5–8.0 percent of GNP. How do you explain this discrepancy? This is about the same percentage of GNP as your prior estimates. How can you double your estimates and still have the same percentage?

Answer. Since 1976 we have consistently stated, and we continue to believe, that defense spending consumed an almost constant share of Soviet GNP—11 to 12 percent or 12 to 13 percent depending on how defense spending is defined. We are not aware of any data published by CIA in 1978 that show defense expenditures absorbed about 6.5 to 8.0 percent of GNP.

Senator BYRD. Can you supply this subcommittee with the documents from Soviet sources that substantiate 4–5 percent annual inflation in the prices of Soviet defense goods and services and 10 percent inflation in Soviet weapons procurement prices?

Answer. We have not estimated that the annual rate of inflation in the Soviet defense sector has averaged 4–5 percent nor that there has been 10 percent average annual inflation in Soviet weapons procurement prices. [Deleted.]

We believe that price inflation exists in other defense industries as well because the same inflationary pressures (falling rate of labor productivity and increasing production costs) are at work throughout the defense sector. We do not at present have an estimate of inflation for total defense spending.

It has been suggested in testimony before the Committee that average annual inflation rates of 4–5 percent in the defense sector as a whole and 10 percent in weapons procurement are approximately those that would be necessary to reconcile our constant price estimates of Soviet defense spending with the current price estimates of M. William T. Lee. But as noted in our answer to question 22, we have examined Mr. Lee's estimates and found them incorrect or unsubstantiated on some important points. As a result, we do not believe that his estimates are useful checks on the accuracy of ours.

Senator BYRD. Have you ever validated your direct costing method by demonstrating that you could reproduce U.S. defense outlays accurately with the same information and the same method? Is it not correct that when you acquired an independent check of 50 billion rubles for 1970 from Soviet sources, you had to double your estimates? In view of this, how can you have confidence in your methodology?

Answer. As we noted in response to a similar question, there are two basic components of our direct costing method for estimating costs of Soviet defense activities—prices and quantities. Our building block methodology uses both of these components to estimate what it would cost to produce and man in the United States a military force of the same size and with the same weapons inventory as that of the U.S.S.R. and to operate that force as the Soviets do. Our price estimates are based on costing models which have been developed from the cost histories of U.S. military programs. In some instances (e.g., pay factors for uniformed personnel) we apply actual U.S. cost data directly to Soviet activities. Therefore, we have had ample opportunity to verify that that price component of our method does reproduce U.S. experience.

Estimating the quantities of U.S. defense procurement, construction, and manpower by national technical means is impractical because of resource constraints. Moreover, a one-time attempt to do this would not provide a meaningful comparison with what has been a long-term effort by the whole Intelligence Community to estimate the numbers of weapons and manpower in the Soviet forces.

We provided an answer to the second question (about the doubling of our estimate) in responses to two previous questions.

With regard to our confidence in the methods we use, you are probably aware of the high confidence the Intelligence Community has in its ability to estimate the number and characteristics of the more visible elements of the Soviet military—e.g., missiles, aircraft, and ships. You may not be aware that we have also identified, in great detail, many of the support activities that make up the rear services in the Soviet military organization. Separate studies have been performed on the size and activity level of the Soviet military training establishment [deleted.] In addition, we have completed in-depth studies of Soviet military POL consumption, maintenance requirements for all categories of weapon systems, and medical services provided to military personnel.

This extensive knowledge of Soviet military forces is the culmination of years of intelligence collection and analysis by all components of the Intelligence Community. Because of this knowledge, we believe there is no area of substantial Soviet military activity that we have overlooked.

[Subsequent to the hearing the Central Intelligence Agency submitted the following information for the hearing record:]

COMPARISON OF UNITED STATES AND SOVIET MILITARY MANPOWER COSTS

1. The share of U.S. defense outlays which can be imputed to manpower varies widely depending on what personnel costs are included. In 1979, approximately 30 percent of the U.S. defense budget was accounted for by pay and allowances of active and reserve military personnel and miscellaneous expenditures directly related to military personnel (see table). Published CIA comparisons of military expenditures incorporate this definition of personnel costs. Using this definition, uniformed personnel costs comprise approximately 35 percent of Soviet defense costs when measured in dollars. This share is larger than in the U.S. case because the Soviets have a proportionally greater number of people in their armed forces.

2. Our civilian cost comparison is less certain than the uniformed personnel comparison because of ambiguities in U.S. and Soviet civilian employment policies. Much direct civilian support is provided to the U.S. and Soviet armed forces in the form of contract work and is accounted for in non-personnel cost categories such as equipment maintenance. Moreover, the Soviets tend to assign to their uniformed personnel what the United States would consider to be civilian work. This work includes extensive military construction activities carried out by the U.S.S.R.'s Construction Troops. With these conceptual dissimilarities in mind, we estimate that the 18 percent share of the U.S. defense budget accounted for by civilian personnel compares roughly to a 9 percent share for the Soviets. When military pensions are added to uniformed and civilian personnel costs, the total shares of estimated dollar costs of U.S. and Soviet defense activities which can be attributed to personnel rise to nearly 60 percent for the United States and approximately 50 percent for the U.S.S.R.

3. While dollar cost measures are appropriate for comparing the sizes of U.S. and Soviet defense programs, estimates of ruble outlays are better indicators of the Soviet view of their defense effort. When calculated in rubles, rather than dollars, personnel costs comprise a markedly smaller share of the U.S.S.R.'s defense outlays. Pay and allowances for uniformed Soviet military personnel account for an estimated 15 percent of the U.S.S.R.'s total defense outlays. The share for the Soviets. When military pensions are added to uniformed and included.

4. There are two key reasons for the disparity between the shares of Soviet defense costs accounted for by personnel when the shares are calculated in terms of rubles and dollars. One is that conscripts, who comprise approximately 70 percent of the Soviet military, receive only nominal ruble wages. In our dollar cost estimates, however, conscripts are credited with the relatively high U.S. pay rates. The second is technological: the U.S.S.R. is at a comparative disadvantage in the production of advanced military hardware, and the procurement of weapons in the large quantities required by the Soviet armed forces is relatively expensive in rubles. Therefore, ruble personnel costs are relatively low.

UNITED STATES AND SOVIET MILITARY PERSONNEL COSTS IN 1979—PERCENTAGE SHARES OF DEFENSE OUTLAYS [1]

	United States	U.S.S.R. (dollars)	U.S.S.R. (rubles)
Pay and allowances for uniformed and reserve personnel [2]	30	35	15
Civilian salaries [3]	18	9	2
Retired pay	9	5	2
Total shares	57	49	19

[1] Source for U.S. data is "Secretary of Defense Posture Statement for FY 1980," (pp. 21 and 276). Soviet percentages reflect CIA estimates.

[2] This category consists primarily of pay for uniformed personnel but it also includes such items as housing medical supplies, food, portions of base operating costs, individual training, recruiting, and education for dependents.

[3] Civilian salaries include only those civilians hired directly by the Department of Defense or Ministry of Defense. The U.S. figure includes, in addition, foreign nationals hired by host governments to support U.S. activities overseas. If these people are excluded, the share of U.S. defense outlays accounted for by civilian salaries would be 17 percent.

[Whereupon, at 11:55 a.m., the hearing was adjourned, the subcommittee to reconvene subject to the call of the Chair.]

SOVIET DEFENSE EXPENDITURES AND RELATED PROGRAMS

MONDAY, FEBRUARY 4, 1980

U.S. SENATE,
SUBCOMMITTEE ON GENERAL PROCUREMENT
OF THE COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The subcommittee met at 9 a.m., pursuant to notice, in room 1114, Dirksen Senate Office Building, Senator Harry F. Byrd, Jr., chairman, presiding.

Present: Senators Byrd, Jackson, and Thurmond.

Staff present: Rhett B. Dawson, counsel; Edward B. Kenney, and Don L. Lynch, professional staff members; John T. Ticer, chief clerk; and Lynn E. Cowart, clerical assistant.

Also present: Frank Gaffney, assistant to Senator Jackson; Quentin Crommelin, assistant to Senator Byrd; John Stirk, assistant to Senator Morgan; and Mike Donley, assistant to Senator Jepsen.

Senator BYRD. Nine a.m. having arrived, the committee will come to order.

The Subcommittee on General Procurement met in November of last year to hear testimony on Soviet military spending. Although exact estimates of Russian military spending varied, it was clear from all testimony given that Russian spending for weaponry far exceeds similar expenditures in the United States and that only a relatively small portion of the Russian military budget goes to personnel costs, whereas the exact opposite is the case in the United States.

Additionally, the subcommittee learned that the export and transfer of American plant, machinery, and technology to Russia has made a direct and important contribution to the development and production of Soviet weaponry and military equipment. Among the examples of such assistance was the transfer in 1973 of 164 Centalign-B miniature ball-bearing machines, which apparently have since been used by Russia to make the reentry vehicles of the SS–18 ICBM more accurate.

This and similar information was supplied by Dr. Jack Vorona of the Defense Intelligence Agency. When I asked Dr. Vorona if American exports had assisted in developing the Soviet war machine, he replied, "Yes, sir."

Today the subcommittee will continue its study of the impact of the arms production of potential adversaries on the military procurement program of the United States. Specifically the subcommittee will seek to determine the extent of American export assistance to arms production in Russia and in other nations which must be considered potential adversaries.

Each year, this subcommittee reviews programs involving billions of dollars for weapons procurement. These programs are needed primarily to counter the awesome military forces of Russia and other Communist bloc nations.

If the export of American and Western plant, machinery and technology is contributing to Russian military might, then the export policies of the United States and our allies are, themselves, a significant factor in increasing the military threat which the Congress—or rather the American taxpayers—must counter through the expenditure of billions of tax dollars for defense.

If our own export policies are permitting trade which generates an increased military threat which must thereafter be met by billion-dollar domestic arms purchases, then this subcommittee has a direct interest in seeing a long-term revision of our export policies on a priority basis.

The President's announced decision to restrict high technology trade with Russia is a helpful first step, if it is substantive and not rhetorical. Also, why should there not be a total embargo?

This morning the subcommittee will hear testimony from Lawrence Brady, former Acting Director of the Office of Export Administration at the Department of Commerce, and from Kent Knowles, who currently holds that position. We also will receive testimony from other witnesses from the Department of Commerce, and from witnesses from the Department of Defense.

The subcommittee appreciates the fine cooperation of the Department of Commerce and the Department of Defense and of Mr. Brady in preparing for this hearing. And I welcome all of you.

The subcommittee is meeting in open session, and, therefore, I remind witnesses to observe national security classification requirements. Any question that the Chair might put which a witness may feel is in a classified category can be held until the committee is able to go into executive session.

At this point our distinguished Senator from New Hampshire, Mr. Humphrey, has a statement, which I will submit for the record on his behalf.

[The prepared statement follows:]

PREPARED STATEMENT BY U.S. SENATOR GORDON J. HUMPHREY

I would like to thank the distinguished chairman and other members of the subcommittee for the opportunity to submit a statement before the General Procurement Subcommittee.

As you well know, we are actively engaged in the weighty and complicated task of examining the extent that critical technology has enhanced Soviet military capability. I hope we can get to the bottom of this problem. If we haven't paid attention before to how sales of critical U.S. technology over the years has enhanced Soviet military capability, we should begin to weigh its significance in view of the skill by which the Soviets invaded Afghanistan.

Soviet trucks built with U.S. help carried troops and supplies into that embattled country. The invasion, undertaken with Soviet equipment from factories built with U.S. help, is only the tip of the iceberg. An investigation into the extent of that diversion, as well as other documented cases, will reveal more than a decade of coverups that shrouded a disregard for rules and regulations to check the flow of critical technology as it contributed to Soviet military might.

When a New Hampshire constituent of mine, Lawrence Brady, sought in his official capacity as the deputy director of the Commerce Department's Office of Export Administration to make this information known to Congress and the

American people, he was subjected to official demotion, harassment and intimidation.

Throughout his government career, Mr. Brady had consistently received commendations from his superiors—until he was asked last year to testify before the House Armed Services Research and Development Subcommittee. His testimony ran counter to his Department's official line. At that point, his own career was on the line.

Commerce Department officials have insisted all along that diversion in the case of Kama River never occurred because there were no restrictions to the military use of U.S. technology in agreements signed between the United States and the Soviet Union. To implicitly admit that diversion indeed occurred, as Commerce Department Secretary Philip Klutznick did in recent testimony before the Senate Banking Committee, should have bolstered the warnings made months ago by Mr. Brady. Instead, Mr. Kutznick's Department forced Mr. Brady to resign.

The nation owes a tremendous debt of gratitude to Mr. Brady for exposing the harm rendered to our national security by selling critical technology to the Soviets. Through his efforts, he has drawn attention to gross institutional ineptitude, systematic coverup and a breach of the trust Congress placed in its public officials.

I only hope Mr. Brady's warnings aren't too late. The subcommittee now needs to take the lead in giving attention to what our nation will have to do to regain the advantage in critical technology to avoid further harm to our national security.

Based on considerable evidence, it is now apparent that the Soviets subject all technology to a dual purpose. The United States must cease to arm its enemy and reverse that trend. We must seek to bring critical technology under closer scrutiny. Among other things, Congress should seriously consider allowing for congressional veto over presidential decisions which, for political reasons, have countermanded the Defense Secretary's recommendations, based on national security. We've seen a number of presidential overrides. The effect has been to give the Soviets a major technical leg up in helping build their military machine. Despite the President's recently announced ban on further sales of critical technology to the Soviets, we continue to see a concerted effort to end-run the embargo on high technology.

We must avoid placing ourselves in the position we were in prior to World War II. We must never again allow ourselves to arm an adversary whom we may be forced to face in the future.

Senator BYRD. Mr. Brady, if you are ready, please begin.

STATEMENT OF LAWRENCE J. BRADY, FORMER ACTING DIRECTOR, OFFICE OF EXPORT ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE

Mr. BRADY. Thank you, Mr. Chairman. As you know, up until January 21, I was the Deputy Director of the Office of Export Administration and, for a period of time, the Acting Director of that office. That office is the one within the Department of Commerce that is charged with lead responsibility for controlling the flow of United States dual-use technology to Communist destinations.

I appreciate your invitation to appear before this subcommittee, which is concerned with procurement by the Federal Government of essential equipment and material. I shall therefore focus on matters which relate primarily to the jurisdiction of your subcommittee even though the issues in which I am involved extend to other equally serious matters touching on the constitutional rights of Congress and my rights and obligations as a Federal employee sworn to uphold the Constitution.

I resigned from the Commerce Department on January 21, 1980, after many years in public service. I was forced to this step because my constitutional and civil service rights as a Federal employee to communicate with Congress were violated, because the Commerce Department failed to enforce its own regulations which prohibit Soviet diversion of U.S. technology to the military and because I could no longer serve within an agency where the national security interests of this country were persistently ignored.

The transfer of advanced technology of potentially important military use by other powers, particularly the Soviet Union and its satellites, is of direct concern to your subcommittee. The illegal transfer of the technology about which I shall be testifying has given such an advantage to the Soviet Union and Soviet bloc that it will require hundreds of millions of dollars of additional expenditures by the Federal Government even to begin to overcome the technical advantages which the Soviet bloc has acquired.

Even more serious than the costs involved is the serious strategic and tactical disadvantage, both in present and in future equipment, which this illegal transfer has imposed on the United States in national security affairs.

As evidence of the magnitude of that disadvantage, I should like, with your permission, to enter into the record at the outset of my testimony an article which appeared in the February 4, 1980, issue of Business Week, entitled "The Defense Production Gap, Why the U.S. Can't Rearm Fast."

I believe that the issues raised by that article and the judgments it contains reflect the consensus of responsible military, industrial, management, and procurement officials as to the serious disadvantages which now confront the United States in its efforts to survive the Soviet threats to our security.

My testimony describes the unfortunate and unnecessary and illegal contribution of officials in the Federal Government, most of them in the Department of Commerce, to this dire situation in which we now find ourselves.

For the sake of brevity, I shall now proceed to summarize my statement, whose text I should like to place into the record, with your permission, in its entirety.

Senator BYRD. The text of your statement, as well as the other material which you mentioned earlier, will be published in the record following your remarks.

Mr. BRADY. The issue before the subcommittee is the extent to which our technology and knowhow have made a contribution to Soviet military capabilities. In his recent message to Congress, President Carter announced a significant increase in defense expenditures over the next 5 years, possibly the largest in peacetime history. The question which must be answered is the extent to which the trade policies of this and previous administrations have created this enormous financial burden which our citizens must bear.

I would like to segment my testimony into three parts. First, I would like to describe the failure of the Commerce Department to respond when it was established that there was a diversion from civilian to military use of the products from the Soviet Union's Kama River truck plant. This plant, built and financed with U.S. help, is involved

in the production of military vehicles now being used in the invasion of Afghanistan.

Second, I would like to debunk some of the prevailing myths which cloud the issue of U.S. East-West trade and, third, the effect of such improvident technology exports to the Soviet Union on the U.S. economy and defense procurement as a whole.

Kama River and the Commerce Department: Perhaps the most serious development since Kama River trucks were first seen with units of the Soviet military has been the failure of the Commerce Department and other agencies to properly investigate those reports and to enforce existing regulations which prohibit such diversion.

Instead, the Government embarked upon a coverup, an effort to withhold vital information from Congress and the public, which violated the right of Congress to know the facts and, incidentally, transgressed my rights as a career civil servant. Inevitably, their actions brought them into conflict with the Congress itself and, in my own personal case, with the Merit Systems Protection Board and the Office of the Special Counsel.

In late April I received a note from the Department of Defense which asked me to make a review of the conditions and safeguards that had been attached to the Kama River plant. I began doing that and, over a period of 5 or 6 weeks, we were drafting a recommendation to the policy level within the Department of Commerce.

That initially was going to be a joint memorandum with the Department of Defense. I talked with the Department of Defense repeatedly. That draft recommendation was made to the Department of Commerce on May 24. However, on May 23, 1979, I accompanied Deputy Assistant Secretary Marcuss to hearings scheduled by the House Armed Services Subcommittee on Research and Development.

The subcommittee evidenced a great deal of concern about the extent to which U.S. technology was being improperly utilized within the Soviet Union. That morning they had received from the CIA a confirmation of reports that large-scale diversion to the military was under way at the Kama River truck plant.

They were also concerned about the fact that testimony was being scrubbed and that at least one other witness had been threatened by the Office of Management and Budget.

Following Mr. Marcuss' appearance I was invited to testify as the Acting Director of OEA as to the accuracy of his remarks. I responded to several questions of the subcommittee and disagreed at several points with the testimony of Mr. Marcuss. My oath of office imposed that obligation of truthfulness on me. From that day my career within the Commerce Department was finished, as I was soon to learn.

I was called back to testify the following day and I declined to comply with instructions given me by officials of the Department of Commerce that I follow official line only and that I have no personal opinion.

During that testimony, I stated that the national security export control program was being mismanaged and that the Commerce Department was not enforcing its own regulations which prohibit the military diversion of U.S. licensed technology.

At that point the Commerce Department made a fateful decision. The proper one would have been to immediately verify the reports concerning diversion at Kama River and apply sanctions against the plant, as I had recommended. Instead the agency chose unwisely in my view. It decided to prepare what amounted to be legal briefs in the defense of the Soviet Government which justified continued U.S. shipments of technology to the Kama River plant. The Commerce Department argued and continues to argue to this day that military production there violates no Soviet understanding or agreement with the U.S. Government.

Immediately following my second appearance before the subcommittee, the Commerce Department began to take illegal reprisals. I refer to the report prepared by the Office of the Special Counsel of the Merit Systems Protection Board, which was completed after a 5-month investigation.

The report finds the Commerce Department attempted to inhibit and interfere with my right to furnish information to the Congress. The report also found that the agency took steps to isolate me from other OEA staff members and remove the policymaking and executive responsibilities granted me as a member of the Senior Executive Service, again in violation of my rights.

Congressional interest in the operation of the OEA had been aroused by the facts emerging from the controversy between me and the Department concerning diversion of the Kama River truck plant. The Senate Banking Committee scheduled hearings for November 28, hearings that had originally been asked for by Senator Humphrey and Senate Jake Garn.

An unsuccessful effort was made to keep me off the witness list. On the day I testified, the Commerce Department first issued a press release aimed at undermining my credibility. And then, while I was testifying, Department officials held a press conference to make further accusations.

After the November hearing my position in the Commerce Department became intolerable. The agency was circulating "eyes only" memos soliciting whatever information could be used to undermine the conclusion of the Special Counsel's Office.

On Christmas Day, 1979, Soviet motorized divisions transported in Kama River trucks crossed the Afghan border. Within a matter of days the invaders were able to occupy the country, thanks in good part to vehicles manufactured with the help of U.S. technology and financed with U.S. help.

On January 4 President Carter announced a partial export licensing moratorium with respect to the Soviet Union. One would have thought that, with the Presidential announcement, the Commerce Department would abandon its efforts to misinform the Congress. It did not but intensified its activities.

As a matter of fact, the investigation of the Kama River diversion matter, which the Compliance Division, my former office, was finally ordered to do, was subjected to intense pressure and manipulation by higher level policy officials in the Department of Commerce to the extent that some of the criminal investigators would not sign the report at various times, to the extent that some of the files were kept from the investigators for certain periods of time.

Senator BYRD. May I interrupt? You mention investigators. Investigators from what department?

Mr. BRADY. They are criminal investigators from the Department of Commerce. In the Office of Export Administration there is a division called the Compliance Division, that has as its function the enforcement of the Export Administration statute. They were finally, I believe in October, asked to do an investigation of the Kama River diversion matter. And there was a team of three individuals. And they undertook that investigation.

Senator BYRD. Thank you.

Mr. BRADY. Now let me address what I would call the mythology of East-West trade. Since 1972 it became fashionable to see trade and commercial exchange as the vehicle not only for world peace but for the solution of a whole range of international problems. This mythology is carried to its farthest and most absurd extreme in the realm of East-West trade.

Broad, new trade vistas supposedly opened up in the wake of the 1972 United States-U.S.S.R. summit and, given the recession of 1974, American companies rushed in to get what they felt was their share of the market.

Eight years have transpired and it is time to review the mythology which hides the reality of the nature of our relationships with totalitarian countries.

First, the volume of U.S. trade with the Communist world is low despite strenuous promotion efforts by the U.S. Government, and it is likely to remain low for the foreseeable future.

Second, increased East-West trade in high technology has not brought advantages to U.S. workers or taxpayers. Instead, it has resulted in a technology drain to the Soviet Union with little or no gain to the United States or to its major trading partners.

Third, it is false to assert that Western technology has made merely a negligible contribution to Soviet economic and military progress. I believe it is fair to say that, without assistance from the West, the Soviet Union would not have achieved its present level of economic development and, without that economic basis, they would not be able to challenge us around the world.

Finally, it is a myth that increased trade with the U.S.S.R. has brought peace. If anything, the injection of Western technology and credit has greatly enhanced Soviet warmaking capabilities and enlarged their ambitions for territorial conquests and concessions from the West.

I would like to address the third area I mentioned, technology exports and defense procurement. In its broadest sense, technology can be defined as the application of science or the ability to develop new inventions and produce new products on the basis of scientific research. Until the past few years there was little argument over the fact that in most areas the United States maintained a commanding technological lead over other nations.

However, we have exported a good deal of our technology and a good deal of that lead. The national security implications of these exports have proven to be great, particularly in the face of Soviet aggressiveness.

America, unlike the Soviet Union, which is a supreme military state, is on the threshold of achieving the dream of the tsars—namely, domination of Europe and then quite possibly domination of the world.

America has suffered the trauma of defeat in Vietnam. The system of alliances which we attempted to build since the end of the Second World War appears increasingly fragile. Yet our one abiding advantage, produced only in a free society, appears to be the perishable technological lead which makes our Armed Forces the envy of all other nations.

I would like to stress that this lead was purchased at enormous domestic expense, not only for private companies but for U.S. taxpayers.

We have seen a trend since World War II in which the U.S. Government has increasingly lost the ability to regulate the flow of transfer of U.S. technology and know-how. In that vein I could give you a number of examples which would prove that we have transferred to the Soviet block technology which is coming back to haunt us.

I don't believe there is any better example, however, than what we have done with regard to the Soviet truck industry across the board in the Soviet Union, not only the Kama River plant, which is only the tip of the iceberg.

Mr. Chairman, in 1968, when the Soviets invaded Czechoslovakia, they had to take buses off the streets of Moscow to get their troops into Czechoslovakia. It is ironic that in 1979, when they invaded Afghanistan, there weren't any buses involved; there were trucks, lines and lines of them. They were trucks which we have helped them build.

We helped design and finance and build the Kama plant. Not only that but we have exported to the ZIL truck plant, we have exported to the other truck plants in the Soviet Union. We have perfected the engines in their Soviet truck industry.

There is no worse comment, however, to that technology transfer than, I think, the following, and that is that at the time that we were bombing the trucks on the Ho Chi Minh Trail and in Vietnam and at the time the trucks were arriving on Soviet ships in Haiphong Harbor we were exporting machine tools and computers to the very plant that was manufacturing this truck here.

This is the ZIL 131. It was the backbone of the Soviet effort in Vietnam. And that is the plant to which we exported machine tools in the early 1970's. The ZIL 131, some in the Department of Commerce have said, is only a commercial truck. Witnesses before previous committees in the last year have said, yes, it is true that some of the trucks are going to the military but that they are just wholly normal goods.

Well, Mr. Chairman, in this Austrian publication, which is an open publication, here we have the ZIL trucks; one is hauling an SA2 Guideline missile. There are pictures after pictures of what these trucks are doing in the Soviet military.

The bottom line is that they have given the Soviet military conventional forces the mobility and the flexibility which they did not have in 1968.

Senator BYRD. Have you completed your statement?

Mr. BRADY. I just want to make one last statement, and that concerns the Commerce Department and the export control system as it exists today. Since 1972, I believe, there have been two major ini-

tiatives under way to gut the effectiveness of the Federal Government's capability to regulate strategic trade. First, the Export Administration statutes, originally designed to protect the national security, have been radically amended and denuded. The holes in the net have been forced apart.

Second, the operations of the Office of Export Administration have been undermined to the point that it can no longer effectively perform its mission.

It is important at the outset to emphasize that there is an inherent conflict in the mission of the Commerce Department. The Commerce Department has major responsibilities in the area of export promotion. The function of the Office of Export Administration is to control.

It is my very strong personal belief that this conflict is irreconcilable and that OEA should exist as an independent agency.

It is my feeling that, from the time the present administration took office, efforts to limit the authority and effectiveness of that office were intensified. This is not to say that such practices did not occur in previous administrations. At the time the original export licenses for Kama were approved, beginning in 1972, over 150 were pulled out of the system and personally handled by Henry Kissinger, then National Security Adviser to the President.

The situation, however, has become even more intolerable as staff shortages developed while the work load mounted. In 1969, the Office of Export Administration had 272 people. It had a larger caseload but, as that caseload was cut, it was the easier items that were removed from control. Today it has an authorized head count of 174 but has on board about 135 people. There is a vacancy rate of 35, 36 people.

The figures I cite tell only part of the story. Even more revealing are the findings of the Special Counsel's Office of the Merit Systems Protection Board, which undertook an investigation of my allegations of mismanagement and violations of the whistle-blower protections provisions of the Civil Service Reform Act.

Their report on one of our decisionmakers states the following: Mr. Marcuss has shown he lacks confidence in OEA management. This was an impression gained very quickly by the staff because of his general attitude toward the operations and its employees. At the OEA management level, division directors and up, 7 out of 10 positions became vacant from December 1978 through July of 1979. That gives some indication of a morale problem and a managerial conflict.

In conclusion, Mr. Chairman, I would like to address the President's recent moratorium on shipments of high technology items to the Soviet Union. I recommend that the Senate investigate the effectiveness of that presumed moratorium. At this time it does not apply to East European countries. We can only assume a significant leakage will occur.

Second, I predict with confidence that, when it comes to East-West trade, within a matter of months the Commerce Department will be back in business as usual.

I also urge the Congress to investigate the Commerce Department's failure to administer the law as Congress intended and the Department's failure to enforce its own recommendations.

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Once again I appreciate the opportunity to testify. I will be pleased to answer your questions.

[Mr. Brady's prepared statement follows:]

PREPARED STATEMENT OF MR. LAWRENCE J. BRADY

My name is Lawrence J. Brady, and I am the former Acting Director of the Office of Export Administration within the Commerce Department. The OEA is the agency charged with the lead responsibility for controlling the flow of U.S. dual-use technology to communist destinations.

I appreciate your invitation to appear before this subcommittee, which is concerned with procurement by the federal government of essential equipment and material. I shall therefore focus on matters which relate primarily to the jurisdiction of your subcommittee, even though the issues in which I am involved extend to other equally serious matters touching on the Constitutional rights of Congress and my rights and obligations as a federal employee sworn to uphold the Constitution.

I resigned from the Commerce Department on January 21, 1980 after many years in public service. I was forced to this step because my constitutional and civil service rights as a federal employee to communicate with Congress were violated, because the Commerce Department failed to enforce its own regulations which prohibit Soviet diversion of U.S. technology to the military; and, because I could no longer serve within an agency where the national security interests of this country were persistently ignored.

The transfer of advanced technology of potentially important military use by other powers, particularly the Soviet Union and its satellites, is of direct concern to your subcommittee. The illegal transfer of the technology about which I shall be testifying has given such an advantage to the Soviet Union and Soviet bloc that it will require hundreds of millions of dollars of additional expenditure by the federal government even to begin to overcome the technical advantages which the Soviet bloc has acquired.

Even more serious than the costs involved is the serious strategic and tactical disadvantage, both in present and in future equipment, which this illegal transfer has imposed on the United States in national security affairs. As evidence of the magnitude of that disadvantage, I should like with your permission to enter into the record at the outset of my testimony an article which appeared in the February 4, 1980 issue of Business Week, entitled, "The Defense Production Gap, Why the U.S. Can't Rearm Fast."

I believe that the issues raised by that article and the judgments it contains reflect the consensus of responsible military, industrial, management and procurement officials as to the serious disadvantages which now confront the United States in its efforts to survive the Soviet threats to our security.

My testimony describes the unfortunate and unnecessary and illegal contribution of officials in the federal government, most of them in the Department of Commerce, to this dire situation in which we now find ourselves.

For the sake of brevity, I shall now proceed to summarize my statement, whose text I should like to place into the Record, with your permission, in its entirety.

The issue before the subcommittee is the extent to which our technology and know-how has made a contribution to Soviet military capabilities. In his recent Message to Congress, President Carter announced a significant increase in defense expenditures over the next 5 years, possibly the largest in peacetime history. The question which must be answered is the extent to which the trade policies of this and previous administrations have created this enormous financial burden which our citizens must bear.

I would like to segment my testimony into three parts. First, I would like to describe the failure of the Commerce Department to respond when it was established that there was a diversion from civilian to military use of the products from the Soviet Union's Kama River to truck plants. This plant, built and financed with U.S. help, is involved in the production of military vehicles now being used in the invasion of Afghanistan.

Second, I would like to debunk some of the prevailing myths which cloud the issue of U.S. East-West trade, and third, the effect of such improvident technology exports to the Soviet Union on the U.S. economy and defense procurement as a whole.

KAMA RIVER AND THE COMMERCE DEPARTMENT

Perhaps the most serious development since Kama River trucks were first seen with units of the Soviet military, has been the failure of the Commerce Department and other agencies to properly investigate those reports, and to enforce existing regulations which prohibit such diversion. Instead, the government embarked upon a coverup, an effort to withhold vital information from Congress and the public, which violated the right of Congress to know the facts and, incidentally, transgressed my rights as a career civil servant. Inevitably, their actions brought them into conflict with the Congress itself and, in my own personal case, with the Merit Systems Protections Board and the Office of the Special Counsel.

I would like to take the next few minutes to describe the events of the past nine months, and the harm done to national security interests of the United States as a result of misbehavior of senior Commerce Department officials in this matter.

In late March 1979, as Acting Director of the Office of Export Administration within the Commerce Department, I received a memo from the Department of Defense concerning a classified cable sent from our embassy in Moscow to the DoD indicating there were persistent reports that trucks from the Kama River plant were being diverted to the military, and that an undetermined number of engines from the plant were being installed in a variety of military vehicles, including armored personnel carriers. This is the same equipment, incidentally, that is now being utilized by the Soviet Union in its invasion of Afghanistan.

The memo requested an opinion from the OEA as to whether such diversion was a violation of the conditions under which the original validated export licenses had been granted. Since the memo did not have a copy of the cable attached, I sought from them immediately a copy of the document.

During the month of May, Congress had hearings underway to extend the Export Administration Act of 1969, as amended. Legislation was pending which would have had the effect of virtually eviscerating the already porous national security export control process.

The initial hearings on the legislation were held by the Senate Subcommittee on International Finance, chaired by Senator Adlai Stevenson, and the House Subcommittee on Economic Policy and Trade, chaired by Representative Jonathan Bingham. The Commerce Department made no effort to solicit the views of the Office of Export Administration and its line staff in its testimony.

On May 23, 1979, I accompanied Deputy Assistant Secretary Stanley Marcuss to hearings scheduled by the Subcommittee on Research and Development of the House Armed Services Committee.

The subcommittee evidenced a great deal of concern about the extent to which U.S. technology was being improperly utilized within the Soviet Union. That morning, they had received from the CIA confirmation of reports that large scale diversion to the military was underway at the Kama River truck plant. They were also concerned about the fact that testimony was being "scrubbed," and that at least one other witness had been threatened by the Office of Management and Budget. Following Mr. Marcuss' appearance, I was invited to testify as the Acting Director of OEA as to the accuracy of his remarks.

Immediately following my second appearance before the Subcommittee on Research and Development, the Commerce Department began to take illegal reprisals. I refer to the report prepared by the Office of the Special Counsel of the Merit Systems Protection Board, which was completed after a five-month investigation. The report finds the Commerce Department attempted to inhibit and interfere with my right to furnish information to Congress. The report also found that the agency took steps to isolate me from other OEA staff members and remove the policy-making and executive responsibilities granted me as a member of the Senior Executive Service—again in violation of my rights.

The Commerce Department announced the appointment of a "new management team" for the OEA on June 18, 1979, and I was removed as Acting Director. The agency then restructured OEA to remove me from any position of real authority or responsibility. To give but one example, the Deputy Director of the Compliance Division, Joe Lucciola, was told by the new Director, Sharon Connally, that he was to forward all information pertaining to Kama River directly to her. In the report, Lucciola states:

I responded to several questions from the subcommittee and disagreed at several points with the testimony of Mr. Marcuss. My oath of office imposed that obligation of truthfulness on me.

From that day my career within the Commerce Department was finished, as I was soon to learn. The next morning, I received a call from Mr. Marcuss, who berated me for my testimony and threatened me with the loss of my job. Later in the day, I was notified by the Research and Development Subcommittee that they requested my appearance at further hearings that afternoon. I immediately called Kent Knowles, who is now Director of the OEA and was then Acting Assistant General Counsel of the Department, to ask that he accompany me to the hearings. Mr. Knowles refused.

I then attended the hearings, but first received a phone call from Andrew Manatos, Assistant Secretary of Commerce for Congressional Affairs, in which I was informed I was not to testify as to my personal opinion, but to follow "Administration lines."

I declined to comply with these instructions, and during my testimony, I stated that the national security export control program was being mismanaged, and that the Commerce Department was not enforcing its own regulations which prohibit the military diversion of U.S. licensed technology.

At that point, the Commerce Department made a fateful decision. The proper one would have been to immediately verify the reports concerning diversion at Kama River, and apply sanctions against the plant as I had recommended. Instead, the agency chose unwisely. It decided to prepare what amounted to legal briefs in defense of the Soviet government which justified continued U.S. shipments of technology to the Kama River plant. The Commerce Department argued, and continues to argue to this day, that military production there violates no Soviet understanding or agreement with the U.S. government. Unfortunately, this course of action committed them also to violate my rights as a career civil servant.

"I believe this was done because it was known that Mr. Brady had an active interest in the case, and had been asking me for and getting status reports on the case." (p. 21)

The Commerce Department thus began what can only be described as a public relations campaign to convince Congress that nothing was wrong with the Kama River project. In June 1979, Secretary of Commerce Juanita Kreps, without the approval of the White House, sent a letter to several Senators and Congressmen stating that Soviet military use of Kama River trucks was not "diversion," and that the authority of the Department of Defense did not need to be strengthened in the export licensing process—the objective of a key amendment to be offered to the legislation by Senator Harry Jackson.

Throughout the summer, Congress worked on the extension of the Export Administration Act. Fortunately, neither the House nor the Senate accepted the views of the Commerce Department, and several critical improvements to the legislation were made by both bodies during floor consideration.

Congressional interest in the operation of OEA had been aroused by the facts emerging from the controversy between me and the Department concerning diversion at the Kama River truck plant. The Department still argued that no actionable violations occurred, and sanctions against the plant were not justified. I continued to recommend the contrary. As you know, the President finally took action several months later after the Soviet invasion of Afghanistan.

The Senate Banking Committee scheduled subcommittee hearings on November 28, 1979, on the controversy. The hearings were held at the request of Senator Gordon Humphrey and Senator Jake Garn. An unsuccessful effort was made to keep my name off the witness list. On the day I testified, the Commerce Department first issued a press release aimed at undermining my credibility. Then while I was testifying, Department officials held a press conference to make further accusations.

After the November hearing, my position in the Commerce Department became intolerable. The number of illegal reprisals against me mounted. My duties as Deputy Director were significantly eroded. The agency was circulating "eyes only" memos soliciting whatever information could be used to undermine the conclusion of the Special Counsel's office.

On Christmas Day, 1979, Soviet motorized divisions transported in Kama River trucks crossed the Afghan border. Within a matter of days the invaders were able to occupy the country, thanks in good part to vehicles manufactured with the help of U.S. technology and financed with U.S. help.

On January 4th, President Carter announced a partial export licensing "moratorium" with respect to the Soviet Union.

One would have thought that, with that Presidential announcement, the Commerce Department would abandon its efforts to misinform the Congress. It did not, but intensified its activities. Faced with an imminent transfer I had no choice but to resign.

THE MYTHOLOGY OF EAST-WEST TRADE

Since 1972, it became fashionable to see trade and commercial exchange as the vehicle not only for world peace, but for the solution of a whole range of international problems. This mythology is carried to its farthest and most absurd extreme in the realm of East-West trade.

Broad new trade vistas supposedly opened up in the wake of the 1972 U.S.-U.S.S.R. summit, and given the recession of 1974 American companies rushed in to get what they felt was their share of the market. It appeared to matter little that we and the Soviet Union was locked in a battle for Southeast Asia, and the U.S.S.R. had in no way modified its long-range plans to overcome the West. It was the era of "peaceful competition," when the U.S. felt that its former adversary, the U.S.S.R., would begin to play by new rules of cooperation instead of confrontation.

Eight years have transpired, and it is time to review the mythology which hides the reality of the nature of our relationships with totalitarian countries.

First, the volume of U.S. trade with the Communist world is low, despite strenuous promotion efforts by the U.S. government, and it is likely to remain low for the foreseeable future. The Communist world as a whole (including China) accounted for only 3.1 percent of U.S. exports and 1 percent of U.S. imports in 1978. The bulk of our exports were agricultural products. The manufactured goods we export were not general consumer products but highly specialized advanced technology.

Second, increased East-West trade in high technology has not brought advantages to U.S. workers or taxpayers. Instead, it has resulted in a technology drain to the Soviet Union with little gain to the U.S. or to its major trading partners. The entire free world productive community has been harnessed because this technology should have been reserved to increase trade with our allies. It is in our interest to increase foreign trade to those areas which reciprocally increase our mutual economic stability and national security.

For example, the long-term employment effects of wholesale technology transfers to the non-market economies have yet to be felt. Imports from these slave-labor economies have already virtually wiped out Western Europe's chemical industry, according to the Office of Technology Assessment (OTA) report. And it will not be long before various industries in this country begin to feel the pinch of unfair competition.

In a sense, the COMECON nations have no other means to repay the costs of their imports except to flood Western markets with goods produced by their "sweated" workers. Up until now, East-West trade has been financed largely through Soviet bloc borrowing, COMECON countries are now some $60 billion in debt to governments and private financial institutions in the West. Aside from the fact that this money would have been better spent on our allies, or the Third World, it is also true that COMECON borrowing limits are being reached, and the only way Communist countries can earn the money to pay for the technology already transferred is to penetrate Western markets with their products.

Third, it is false to assert that Western technology has made merely a negligible contribution to Soviet economic and military progress. As far back as the 1920's, U.S. technology played an essential role in the survival of the young Soviet regime. To quote Professor Joan Hoff Wilson, Ideology and Economics: U.S. Relations With the Soviet Union 1918–1933:

"The success of the First Five-Year Plan was absolutely dependent upon credit facilities, heavy equipment, and technology of the Western nations, *particularly the United States* . . ." (Emphasis supplied)

I believe it is fair to say that without assistance from the West the Soviet Union would not have achieved its present level of economic development, and without that economic base they would not be able to challenge us around the world.

If there is any doubt as to the accuracy of the above statement, let me refer to a recent column by Cord Meyer in the February 2, 1980 Washington Star:

"With the wisdom of hindsight, these White House advisers acknowledge that there were early warning signals along the pleasant road to detente. But these intelligence reports indicating that Soviet long-range intentions were less pacific than they seemed were often discounted as alarmist or self-serving.

"In one dramatic example, a Czech major general, Jan Sejna, defected in February 1968 for his influential position as first secretary of the Communist Party in the Czech Defense Ministry. He brought with him to the U.S. the story of how he had personally attended a secret meeting in Prague on Feb. 22, 1968 between Brezhnev, the Czech politburo and the leaders of the Eastern European communist regimes.

"At this occasion, according to Sejna, Ulbricht of East Germany criticized the Russian stress on peaceful coexistence and complained that it was weakening ideological discipline within the bloc. Finally, Brezhnev rose to defend the Kremlin line. He argued that Moscow was not ready for any direct confrontation with the West.

"Brezhnev ticked off the main areas of Russian weakness; the decisive Western advance in modern technology, particularly in computers and electronics, the inadequacy of Russian submarine warfare techniques and the lack of agricultural productivity. He maintained that the Russians needed 10 to 15 years to catch up and that the West could be persuaded by a deliberate relaxation of tensions to provide to Russia the needed credits and technology.

"In a recent conversation with this reporter, Sejna quoted Brezhnev as having promised that when the building had been completed the Soviets would be able to isolate the capitalist countries from their sources of oil in the Middle East. As Senja remembers it, Brezhnev boasted that then, 'We can use this control at any time as a nail in the coffin of capitalism.'"

Finally, it is a myth that increased trade with the U.S.S.R. has brought peace. If anything, the injection of Western technology and credit has greatly enhanced Soviet war-making capabilities, and enlarged their ambitions for territorial conquests and concessions from the West. The subcommittee will shortly hear from expert witnesses concerning the massive and systematic diversion of U.S. technology to the military which has occurred in the Soviet Union. This flow of U.S. support to the Soviet Union is directly due to the failure of our national security export control process.

TECHNOLOGY EXPORTS AND DEFENSE PROCUREMENT

In its broadest sense, technology can be defined as the application of science, or the ability to develop new inventions and produce new products on the basis of scientific research. Until the past few years, there was little argument over the fact that in most areas the U.S. maintained a commanding technological lead over other nations.

The post-World War II period, however, brought a new actor into the world economy—the multinational corporation. Its emergence was bound to change the international economic and trading order. As multinationals expanded their overseas operations, they began to export and disseminate technology, production and jobs around the world. Commerce Department figures give some idea of the magnitude of this rapid expansion. They show that U.S. direct investment abroad by 1978 amounted to nearly $170 billion (book value); the level has more than quadrupled since the early 1960's. Gross capital formation abroad has raced ahead of domestic capital formation.

The growth of these enterprises has presented the federal government with a number of new and complex regulatory problams. As U.S. technology and production were transferred overseas, one of the consequences was that communities across the country were devasted by the loss of jobs and the importation of products from companies using low-wage labor countries operating U.S. production machinery. The Northeast, for example, has been particularly hard hit by the export of jobs.

The national security implications of these technology exports have proven to be great, particularly in the face of Soviet agressiveness.

One does not need to be an expert in foreign affairs to appreciate that the free nations of the world are today undergoing perhaps their most severe test. U.S. influence is being challenged in Southeast Asia, Southwest Asia, the Middle East and other areas. And we face an ever more formidable enemy.

The Soviet Union is the quintessential military state, and it perceives itself to be on the threshold of achieving the dream of the Tsars—domination of Europe, and then quite possibly, domination of the world.

America, on the other hand, has suffered the trauma of defeat in Viet Nam. The system of alliances which we attempted to build since the end of the Second World War appears increasingly fragile. Yet our one abiding advantage, produced only in a free society, appears to be the perishable technological lead which makes our armed forces the envy of all other nations.

I would like to stress that this lead was purchased at enormous domestic expense, not only for private companies, but for U.S. taxpayers. Let me illustrate. Research and development within the private sector is highly concentrated and to some extent, publicly funded. One hundred big companies account for over 80 percent of industry R & D; eight companies account for 35 percent—General Motors, International Business Machines, Rockwell International, Ford, Lockheed, AT&T General Electric, United Technologies, General Dynamics and the Boeing Corporation.

These companies benefit from public support in two major ways. First, tax expenditures encourage the private sector to engage in various areas of R&D. Second, the federal government apportions a substantial part of its annual budget in direct expenditures to support such activities, particularly in the defense area. It is doubtful that a viable and flourishing computer industry would exist in the country without such public subsidies. The FY 1981 budget recently presented by the Administration requests a major boost in defense R&D.

I strongly support the government efforts. My concern, however, is the extent to which the technology produced by these subsidies finds its way into the hands of our adversaries. Unfortunately, in certain instances, some firms have been willing to make a short-term profit at the expense of long-term interests of our nation. Technology is expensive to develop and easy to sell. Indeed, of the companies mentioned above, some have a significant stake in East-West trade and technology tranfer. And we have seen a trend since World War II in which the U.S. government has increasingly lost the ability to regulate the flow of the international transfer of U.S. technology and know-how.

Let me provide you with two examples, which I think you will find are particularly shocking. According to a report recently released by the Office of Technology Assessment, as a result of the 1972 U.S.-U.S.S.R. summit, many American companies entered into technical cooperation agreements with the Soviet Union which called for the exchange of pure, unembodied technology Under existing law, the companies were not required to report the details of such transactions to the Commerce Department, which has the responsibility to monitor East-West trade. Considerable congressional concern existed at the time that national security was being jeopardized through such unregulated transfers of technical data. Although the administration supported improved reporting requirements in the 1974 extension of the Export Administration Act, the final legislation contained no provisions for prior notification to the government of such agreements. What transpired during the years when effective protection against this hemorrhaging did not exist, is anybody's guess.

The second example comes from *The Washington Post*, January 29, 1980, in an article entitled, "Cold War Cold Shoulder," by Daniel S. Greenberg. Mr. Greenberg describes the close relationship which sprang up between the Soviet technical elite and the Ford Foundation. To quote Mr. Greenberg:

"That they (the Soviet technocrats) could move events in the Soviet bureaucracy was demonstrated a decade ago when Gvishiani, responding to a suggestion from Ford Foundation president McGeorge Bundy, got the Soviet Union to join with the United States in setting up in Austria a computer-oriented policy research center, the International Institute for Applied Systems Analysis. It's a one-of-a-kind organization, staffed by researchers from a score of countries and concerned with the scholarly frontiers of computer applications, a field in which the Soviets have acknowledged a serious lag."

Need I remind this subcommittee that today the computer is to warfare what the cannon was in the 16th century.

In conclusion, I would like to address the President's recent moratorium on shipments of high technology items to the Soviet Union. I recommend that the Senate investigate the effectiveness of the presumed moratorium. At this time, it does not apply to East European countries and we can only assume that significant leakage will occur. Secondly, I predict with confidence that when it comes to East-West trade, within a matter of months the Commerce Department will be

back to business as usual. I would like to submit for the record two press accounts concerning the rear guard action the Commerce Department is fighting to protect the continued flow of high technology items to the Soviet Union.

I also urge Congress to investigate the Commerce Department's failure to administer the law as Congress intended and the Department's failure to enforce its own regulations.

Once again, I appreciate the opportunity to testify, and I would be pleased to answer any questions.

Senator BYRD. Thank you, Mr. Brady. You have made some very serious charges. I have other questions that I want to put to you. I will withhold some of them until other witnesses have had an opportunity to testify.

You have referred several times to "illegal technology transfer." What do you mean by "illegal technology transfer"?

Mr. BRADY. Very simply, Mr. Chairman, I mean the transfer of equipment or technology which is sold to the Soviets or to East Europeans for a specific purpose and is used by them for another purpose. That is the bottom line of what I consider illegal technology transfer. And I believe it is the spirit of the law and the spirit of the regulations.

Senator BYRD. You asserted that your constitutional rights as a citizen were violated. What do you mean by that?

Mr. BRADY. I mean, Mr. Chairman, that time and time again the Department conducted a campaign aimed at discrediting me. It was a campaign of defamation. I have a memorandum which states: "This is the kind of items that so-and-so wants on the Brady list." The only thing that was omitted from that memorandum was the hit list.

Senator BYRD. Is the President's new policy being interpreted to apply to only validated export licenses, or is it being interpreted to include all export licenses which could aid the Soviet economy?

Mr. BRADY. At the moment it is my understanding that a review is underway to examine both what we call general licenses, which means that no prior approval of the Government is required before one can make the export of a commodity that is subject to general license.

Supposedly the Government is reviewing whether some of the commodities currently under general license will be placed under validated license, which means that they would have to come in and get authority before it could be shipped.

I would like to draw your attention, however, to one corporation which, I understand, just in the last couple of weeks has an assembly line for a diesel engine operation slated to go to the Kama River plant. This is a general license commodity. In other words, it doesn't need a license.

However, it is clear, as Under Secretary Perry of the Department of Defense indicated, Mr. Chairman, that the military is now the chief customer of the Kama River plant. Now, whether or not——

Senator BYRD. You mean the Russian military?

Mr. BRADY. Exactly. Whether or not that assembly operation for the diesel engine is general license or validated license is critical because we are helping the Soviet military in the most direct manner if we allow that assembly line to go. At the moment it is general license. And I understand the company was told they could ship it.

Senator BYRD. Has the Defense Department protested that action?

Mr. BRADY. Mr. Chairman, I don't know whether they have or not, but let me give an example of the interplay between the Defense

Department and the Commerce Department. Secretary of Commerce Klutznick testified 2 weeks ago. I believe, before another committee of the Senate. He indicated, according to press reports, that he had no reason to believe that the original decision on Kama or the subsequent decisions approving further equipment to Kama—spare parts, machinery, et cetera—he had no reason to question that original decision.

At that very point prior to that testimony, he received a January 11 memorandum from the Department of Defense which is classified, so I can't characterize it in any great depth, but it is flatly contradictory to what Klutznik said.

And this is systematic of the relationship between the Department of Defense and the Department of Commerce. There is a constant attempt to wear down opposition to a particular license application. When the Department of Defense comes in and says, "We want this case denied," Commerce and State go back and say, over and over again, "Well, let's modify it. Under what changes can it be approved?"

Senator BYRD. What is the motivation on the part of the Commerce Department to do that?

Mr. BRADY. Well, you know, the mission of the Department is to promote trade. The Commerce Department in 1972 set up a Bureau of East–West Trade. As a matter of fact, that is where over 100 of those employees in OEA came from. They were taken away from the Office of Export Administration and the Bureau of East–West Trade was set up. Its mission is to promote trade.

It is my very, very strong feeling that the Department does not assess the national security strategic criteria properly and adequately in reviewing those applications.

Senator BYRD. In your statement you quote Daniel S. Greenberg describing the close relationship which sprang up between the Soviet technical elite and the Ford Foundation.

Mr. BRADY. That is right.

Senator BYRD. That is something that I am totally unaware of. What is the situation in that regard?

Mr. BRADY. Well, Mr. Chairman, the Soviets and the East Europeans negotiate with American business communities across the board. In other words, even if they want to purchase one computer, they will negotiate with a number of companies.

Senator BYRD. The Ford Foundation is not a business organization, though?

Mr. BRADY. No; I tried to give you the context in which the Soviets deal. There are a couple of American computer companies, not the Ford Foundation, which establish ongoing relationships with the Soviet Union. Fred Bucy, of Texas Instruments, has characterized this ongoing relationship, not unlike what Greenberg describes with regard to the Ford Foundation, as the most critical flow mechanism for the transfer of technology because it is ongoing and allows the Soviets and East Europeans to keep up with the state of the art.

Senator BYRD. Is the final decision on whether to grant an export license to the Soviet Union made by the Director of the Office of Export Administration of the Department of Commerce? Where is the final decision made?

Mr. BRADY. If all of the agencies agree, the final decision is made by the Director of the Office. If some of the agencies appeal, if there is an agency disagreement, then the case may be escalated to higher policy levels, conceivably to the President. There have been cases escalated to the President before.

But before that happens, the informal situation is, Mr. Chairman, in a sense more important because the Office is overburdened with cases at the moment. It has a backlog that, I believe, is larger than it has even been. There is an absolute reluctance to deny a case on the part of the Department of Commerce. And what happens is this give-and-take and this tension between Commerce and Defense.

Senator BYRD. Where does the pressure to approve export licenses to the Soviet Union come from? Does it come from individual companies? Does it come from the Government? Where does it come from?

Mr. BRADY. It comes from individual companies. It is exerted upon high policy officials in the Government. It is not uncommon for a company to come in to see the Secretary of Commerce, the Under Secretary of Commerce, the Assistant Secretary, and to lay out the reasons why they need a particular case approved.

They also go to Defense for that matter. They have penetrated in a sense the Government apparatus that deals with the export control system and they hit every one of them. There is, as you know, this very, very strong desire to increase trade, so as to improve the balance of payments. And therefore there is a rationalization to approve.

My view is that even though the balance of payments is a terribly important matter, if we then find ourselves exerting tremendous amounts of money to catch up because we have already licensed the technology allowing the Soviets a leap, then we are defeating ourselves.

Senator BYRD. How restrictive is the President's new order in regard to the transfer of technology to Russia? It it a total embargo? Is it a partial embargo? How restrictive is it?

Mr. BRADY. Two weeks ago it appeared to be a fairly total embargo although one of the last actions that I was involved in before I left was when I was ordered to attend a meeting to discuss exceptions to that embargo.

The first exception would have been humanitarian. For instance, if there was something for an intensive care unit in a hospital or something, then presumably the reasoning was we would have allowed it to go. The second exception is far, far more important because I believe the President said we wanted to strike at the economic plans of the Soviet Union. He wanted to hurt their economic plan. There is no better way of doing that than to preclude shipments of spare parts and repair to computers that we have already shipped them. And we have shipped them many computers.

We have also held the belief that in the final analysis the one club we had over them was to keep spare parts, keep repairs from them.

The second exemption would have allowed under a hardship exemption no less the continued servicing and repair of computers that had already been shipped, computers that required visitation or reporting requirements, and they are the big computers.

So in my view that would have been a major—major loophole in the President's order particularly since he had stated that he wanted to

strike at the economic foundation of the Soviet Union. He wanted to make them pay a price economically. That would have relieved that price.

Senator BYRD. If that is the case, why would it not be best to go to a total embargo?

Mr. BRADY. Well, Mr. Chairman, I think that is very, very good logic. Let me draw another couple of examples for you.

Two licenses for Kama River were revoked. However, the licenses for the ZIL truck plant have still not been revoked. And within that entire time period we talked about Commerce vis-a-vis Defense. But Commerce was still recommending, even after the invasion of Afghanistan—and this is on the written record in memoranda to agencies that those licenses not be revoked. The ZIL licenses have not been revoked.

Senator BYRD. You state in your prepared testimony, "predict with confidence that when it comes to East-West trade"—and I assume you mean Russia specifically—"within a matter of months the Commerce Department will be back to business as usual." On what do you base that assertion?

Mr. BRADY. Let me give you an example, Mr. Chairman.

In August of 1978 the President imposed controls on oil and gas production and manufacturing equipment to the Soviet Union. That was an action taken in response to the trials of some of the dissidents in the Soviet Union, Sharanski, who by the way we forget what he was being tried for. It was because he had indicated to Westerners, and he is a computer technician, that the computers he was working on and intended for civilian use were being diverted to military use, and that is what he was doing.

But, anyway, these controls the President proposed in 1978 on oil and gas production, about 140, 150 cases have been considered under those controls. To my knowledge maybe one or two have been denied. What I am saying is that it was a public relations gimmick. There was no intention to denying those cases. There couldn't have been because they have all been approved.

Furthermore, the current moratorium does not extend to Eastern Europe. We know that Eastern Europe is a sieve for the Soviet Union. The Soviet Union levies requirements on the intelligence agencies of the Eastern European countries.

Each one of those countries is targeted and they are told, "We need this particular technology," not the rhetorical technology but production technology, manufacturing technology, the ability to put a production line into operation.

Now, I think we can assume, Mr. Chairman, that if the embargo does not apply to Eastern Europe, then the Soviets will certainly make requirements on their East European client states to provide them with the parts and the repair essential to the continued functioning of what we have exported to the Soviet Union.

Senator BYRD. That appears to the Chair to be a very strong point.

At this time I wonder if you would take the end chair at the witness table. I would like for you to stand by as we hear from our other witnesses.

The next witness is Mr. Kent Knowles, Director of the Office of Export Administration, Department of Commerce.

Mr. Knowles, I went over your 16-page statement yesterday. It will be inserted in the record in full following your remarks, but I thought perhaps in the interest of time you might extract the key parts and direct your comments to those.

STATEMENT OF KENT N. KNOWLES, DIRECTOR, OFFICE OF EXPORT ADMINISTRATION, DEPARTMENT OF COMMERCE

Mr. KNOWLES. Thank you, Mr. Chairman. I would be happy to do that. In the interest of time I will simply touch on some of the key points and I would be pleased to respond to whatever you like in the way of questions or provide further details for the record if you would like.

Senator BYRD. Thank you.

Mr. KNOWLES. I was asked by the committee to appear here today to describe the national security export control system administered by the Department of Commerce, the means by which we enforce compliance with that system, and the actions which were recently taken at the President's direction in response to Soviet actions in Afghanistan.

Under the authority of the Export Administration Act of 1979 the Commerce Department exercises control over the export of so-called dual use items. These are items having both civilian and significant potential military applications.

We also exercise broad control over the export of technical data. Dual-use items whose export comes under Commerce's jurisdiction appear on the Commodity Control List (CCL). Most items which are either regarded as having only military applications or which are specifically designed for military use appear on the U.S. Munitions List, which is administered by the State Department.

Only a small portion of U.S. exports require the issuance of a specific "validated" license document by the Commerce Department. By far the great majority of exports are shipped under "general license" authority which allows the exporter to ship freely without applying for a validated license. The commodities that do require a validated license, and which appear on the CCL, fall into three general categories which I think are relevant to the committee's consideration.

First, are those products judged to have the potential of contributing significantly to the military capabilities of potential adversaries. Most of these items are controlled multilaterally by an informal organization called COCOM, composed of the NATO nations, minus Iceland, plus Japan. A small group of items are controlled unilaterally by the United States because they are considered particularly sensitive or because they are uniquely available in the United States.

Second, certain items which are controlled for foreign policy reasons; for example, nuclear-related devices and facilities, oil and gas exportation equipment, and crime control and detection equipment.

Within the Commerce Department the Office of Export Administration, of which I am the Director, is responsible for processing applications for the export of items on the Commodity Control List and the technical data associated with them. This represents a large and steadily growing workload, currently running at a rate of 284 incoming applications per day during fiscal year 1979, up from 262 per day in fiscal year 1978, and promising to increase yet further.

Moreover, the workload has been growing not only in volume but in complexity as well. The nature of incoming applications has increasingly reflected the fact that the composition of U.S. exports is shifting increasingly into high technology areas:

Incoming applications are involving steadily more complex systems and technologies which require steadily more sophisticated technical analysis by both Commerce and its advisory agencies and raise ever more difficult export policy issues.

In the interest of expediting matter I will skip over most of the analysis of the process itself and simply mention that most routine items are dealt with fairly expeditiously by the OEA. Those nonroutine items—basically those going to the free world destinations which raise significant policy issues, and most going to the non-Communist world—are forwarded for review and analysis by licensing specialists in one of OEA's three commodity licensing divisions, which are the Computer Division, the Electronic Equipment Division, and the Capital Goods and the Production Materials Division.

The appropriate licensing specialists examine the application in the light of the following concerns:

The equipment's uses and function.

Its level of sophistication.

Its normal pattern of military or civilian use in the United States and elsewhere.

The degree to which similar equipment is freely available elsewhere.

The equipment's suitability for the proposed end-use.

The end-user's known activities.

The possibility that the item might be diverted from the stated end-use to less acceptable uses.

The economic implications of the transaction for the United States.

The Commerce licensing specialist will often consult on an informal basis with experts from other agencies while he is making his analysis.

Those cases which raise policy issues at this point go to the operating committee within the Department of Commerce. A number of agencies are members of that committee, in this context most importantly the Department of Defense.

The cases that go to the operating committee are referred with the Commerce Department analysis and full backup material. The application is reviewed by each of our advisory agencies. DOD can tell you in more detail exactly how they handle particular applications but I can certainly tell you that DOD obtains the views of the armed services and of the people in DOD that have an interest in the particular application.

The cases are thoroughly analyzed, reviewed, and discussed in the operating committee.

I think it useful to note also that the operating committee proceeds by consensus; if there is disagreement by any of the agencies, particularly DOD, the case is not going to go forward and it is not going to be licensed until a consensus is reached. In a very unusual case it may escalate as far as the President. But we are not in the Commerce Department going to be licensing in the face of Defense objections.

Senator BYRD. Are you saying that if the Department of Defense objects, that it has not been the policy to grant an export license?

Mr. KNOWLES. That is right. We do not license in the face of Defense objections. We feel a responsibility, indeed, it is our responsi-

bility to discuss a case with them from a technical level, from a policy level, from the point of view of the export end-user and other relevant matters. But we do not license in the face of Defense objections.

If there is a disagreement that can't be resolved at the operating committee level then it will escalate through other levels of consideration, through the Deputy Assistant Secretary level, the Assistant Secretary level, and eventually if necessary to the Export Administration Review Board, which is a Cabinet level group that would look at the particular proposed export. An unusual case which has unusual policy implications may well go to the President. Indeed, it is clear that the Department of Defense may under the statute and in any event we welcome them to look at any case they wish. They also have the right by statute to escalate a case to the President if they disagree with a proposed decision on it.

Senator BYRD. Let's try to get to an understanding of what the President's new proposal does and does not do. Does it restrict or embargo exports to Russia?

Mr. KNOWLES. On the high-technology side, which is I assume what you are interested in, although I would be pleased to answer also on the agricultural side if that is of interest to you, the President has directed the Secretary of Commerce to suspend all explicit export permissions to the Soviet Union. That has been done. This means no re-export permissions, no validated licenses, no explicit export permissions of any kind are being issued and will not be issued until the President otherwise directs.

The President has directed, and this has also been done, that all outstanding licenses, all validated licenses, be suspended. We have done that. We have made a mailing to everybody that we believe had a license. We have requested that those licenses be returned to the Department. This process is under way. We gave people 30 days in which to do that and the 30 days is just terminating now.

So there are no outstanding unsuspended validated licenses that would permit shipment to the Soviet Union.

Senator BYRD. Press reports state that the Commerce Department has drafted proposals to provide hardship exemptions on some exports of high technology goods to the Soviet Union. Is that correct?

Mr. KNOWLES. Mr. Brady mentioned and, indeed, he saw a early draft that was for internal discussion only. It simply indicated what areas might be appropriate for internal discussion. There are no hardship exceptions permitted at the present time. There has been no such announcement and I am not aware of any exceptions at the present time.

Senator BYRD. Am I to understand, then, that there cannot be any exports to the Soviet Union of any goods at all? Is that correct?

Mr. KNOWLES. Only on the validated license side. A large proportion of trade with the Soviet Union by the United States is under general license. These are basically commodities which do not have significant military potential.

Senator BYRD. Those can be exported now?

Mr. KNOWLES. Yes, sir.

Senator BYRD. What is the purpose of cutting off grain shipments and not cuting off the other exports?

Mr. KNOWLES. On the grain shipments, all agricultural commodities were stopped including all general license items. This was to give the appropriate departments—Agriculture, Commerce, and other agencies—time to take a thorough look at the picture on the agricultural side——

Senator BYRD. I am speaking now of goods other than agriculture. Agriculture items have been embargoed. What about the nonagricultural items?

Mr. KNOWLES. Just two comments on the agriculture side.

The announcement has been made that the list of agricultural items has been split into three lists: One on a prohibited list, one for validated license, and one group is now under general license.

Senator BYRD. Are you saying there has not been a total agricultural embargo?

Mr. KNOWLES. There was originally.

Senator BYRD. But there is not now?

Mr. KNOWLES. There is not a total embargo at this point.

Senator BYRD. Of agricultural products?

Mr. KNOWLES. That is right.

Senator BYRD. It is only an embargo on grain? Is that right?

Mr. KNOWLES. On grain, on meat and those items which will have a direct and substantial effect on the Soviet Union in the judgment of the Department of Agriculture and other policy officials. Grain is an area, I understand from the agricultural people, on which there is considerable leverage over the Soviet economy. The same is not true of the items that are still proceeding under general license. There is much foreign availability and there is no leverage on the part of the United States over the Soviets.

Senator BYRD. Do you feel that there should be a total embargo on trade with the Soviet Union?

Mr. KNOWLES. Well, I am not a policy official. I am not making that decision, Mr. Chairman. The understanding I have is that the agricultural side was very carefully drafted so that the maximum impact would be had on the Soviets in areas where the United States has leverage and to let go those limited items and small amount of trade that would not have the impact and which there was large foreign availability. Therefore, there was very little ability for the United States to affect the Soviets without hurting our own agricultural sector far more.

But, again, on the high technology side——

Senator BYRD. Let me see if I understand this. From what you say, there has been only a partial embargo of agricultural products.

Mr. KNOWLES. That is correct. The announcement has been made that the change is to a partial embargo on agricultural items and it is along the lines that I indicated to you, sir.

Senator BYRD. On nonagricultural items—I am not sure whether this was a part of the official announcement or not but you would know—here is a quote from a report provided to the committee by Frank Moore at the White House, that:

We will severely restrict trade and exchange of all kinds in a way that will be costly to the economic plans of the Soviet Union.

I take it by the use of the word "restrict" that there is not a total embargo on nonagricultural items, either?

Mr. KNOWLES. That is correct, sir, but I would like to go on and note that the President directed and there is now actively functioning a review of the entire trade picture with respect to the Soviets. This includes what general licenses are in effect and whether and if so to what degree they should be modified.

Senator BYRD. But they have not been modified?

Mr. KNOWLES. They have not been modified as of now. There are consultations underway with the coordinating committee nations, there has been one trip by Under Secretary of State Christopher and there will be others in the near future to try to coordinate the maximum impact——

Senator BYRD. Here is what I am trying to understand. The President has told the American people that the Russian invasion of Afghanistan is the most serious threat to world peace since World War II. If that is the case, and I don't dispute what he says—I think it is a very serious thing—then why are we fooling around with this; why don't we embargo trade with Russia?

Mr. KNOWLES. Well, I think I am the wrong official to answer that. I would simply note again as I have that the entire trade picture is under active consideration at the present time——

Senator BYRD. How long will that review take?

Mr. KNOWLES. The announcement officially was it would take 4 to 6 weeks from the date of the announcement, which was in early January, and we are on schedule.

Senator BYRD. When do you expect a firm decision as to what you will and what you will not embargo?

Mr. KNOWLES. I would hope within the next 2 or 3 weeks. However, it does not make a great deal of sense to go far beyond what our allies are willing to do. For the maximum impact——

Senator BYRD. Let's analyze that just a minute. Have our allies embargoed grain shipments?

Mr. KNOWLES. There have been talks with all of the main grain exporters, and I understand that the United States has been getting and will continue to get very good cooperation from them. Those talks are continuing.

Senator BYRD. You are better situated to answer this than I am, but my understanding is that the best we have been able to get from our allies is that they will not increase their grain shipments to make up for the loss of grain to Russia by the United States, not that they will discontinue their own shipments. Now could you enlighten me as to whether I am wrong?

Mr. KNOWLES. I have not had a chance to check on that. I have been out of town until Saturday night. I would be glad to provide an update on that. My understanding is that the allies are cooperating, that talks are continuing, that the United States is working and will continue to work very closely with them.

Senator BYRD. Talking is one thing, but action is something else.

Mr. KNOWLES. My understanding is there has been agreement by the major grain producers and exporters that they will not be substituting for those grains that the United States is embargoing.

Senator BYRD. That is right, that they will not be substituting. But has any of our allies, has any nation said, "We will not ship grain"?

Mr. KNOWLES. I will be glad to provide an answer for that for the record. I haven't been in town the last 2 days and I would not want to mislead you in any way. I would note the effectiveness of an embargo is going to be dependent in large part on foreign availability, that is substitutability. This is the major reason why we are talking and will continue to talk to our COCOM allies in order to gain the maximum effect which the President has mentioned and which we are actively trying to carry out.

Senator BYRD. I am trying to ascertain just how serious we are in this endeavor, whether it is a speech, whether it is rhetoric, or whether there are actual results being obtained.

Mr. KNOWLES. I think the President has directed and we have carried out some effective measures. I think what the task is right now—and I can assure you that the review group is active. I can assure you the group is meeting several times a week, that it includes the Department of Defense, State, Treasury, STR, various other people are actively trying to find the best ways to carry out effectively on a long-term basis what the President has directed.

Senator BYRD. You are the Director of the Office of Export Administration for the Department of Commerce.

Mr. KNOWLES. That is correct, sir.

Senator BYRD. In that capacity, do you favor or oppose an embargo on trade with Russia?

Mr. KNOWLES. I think my capacity, Mr. Chairman, is to carry out effectively that which the policymakers decide.

Senator BYRD. Do you have a view? What is your own view?

Mr. KNOWLES. I support what the President has done. I support the efforts that are going on right now, and we will continue to carry them out as best and as effectively as we have been and as I think we will continue to do.

Senator BYRD. The restriction—it is not an embargo—the restriction, as I understand, does not apply to East European countries. Is that correct?

Mr. KNOWLES. The Eastern European countries, the same items that were under validated license to the Eastern European countries are still under valid license. They have not been suspended. We do have under review and will keep track of potential diversion through the Eastern European countries.

Senator BYRD. There is no way you can effectively monitor that.

Mr. KNOWLES. The President's review right now is limited to the context of Russia. When we know where that is coming out, we then can take a more detailed look at how best to implement the decisions, including with respect to European countries. But the review right now is limited to Russia.

Senator BYRD. Can it be very effective if it does not include East Germany, for example, and other Eastern bloc countries?

Mr. KNOWLES. Well, the review right now is limited to Russia, but we will be taking a look at any method that will help accomplish the results of the review. When the final decisions are made we will be taking a look at the ways diversion might occur and take ap-

57-007 O - 80 - 11

propriate steps to prevent them, but I simply do not know at this point where that review is going to come out.

Senator BYRD. Has the Commerce Department canceled the ZIL license?

Mr. KNOWLES. All validated licenses including ZIL and Kama have been suspended. No shipments can be made under them.

Senator BYRD. You have used the word suspended. You have not canceled them?

Mr. KNOWLES. No, nothing can be shipped under them at the present time, however. The ZIL factory we are very aware of. That will be thoroughly looked at during the course of this review. Another case that came up in earlier testimony is a general license item that could be shipped to the Kama plant. The firm involved is well aware we are interested in that case. That case also will be looked at during the course of this review and thoroughly examined.

Senator BYRD. But the action you have taken up to this point has been in the nature of a suspension and not a cancellation, is that it? And how do they differ?

Mr. KNOWLES. The suspension holds things where they are. It does not permit shipments. It allows the review to continue and to reach a decision. As we come up with new national security criteria, as I presume the review will do, then we can run against those criteria the outstanding validated licenses which have been suspended, the present general licenses, and any items that may be newly put under control for either foreign policy or national security reasons.

This way we can reach decisions in a fairly orderly manner on the revocation of outstanding validated licenses or the denial of applications that we have in-house or may receive.

Senator BYRD. Is it correct that the Defense Department has requested that ZIL license be canceled?

Mr. KNOWLES. I believe that is correct. I have not seen any piece of paper that makes that request. However, this is also under, and will continue to be under, active consideration in the course of the review. I believe this request came in last week. DOD is a very active participant, believe me, in the process and Dr. Garber, who will be testifying later, can inform you more directly of his own views.

Senator BYRD. But your department is not canceling the ZIL license as requested by the Department of Defense?

Mr. KNOWLES. At this time, that is correct. We are following the President's directive here. We are listening to the Department of Defense. We understand that that is what they would like and the decision will be made in the course of the review.

Senator BYRD. Could you give the committee a date as to when this review will be completed?

Mr. KNOWLES. The original schedule, as stated I believe by Jodie Powell, was 4 to 6 weeks from the date it was announced.

Senator BYRD. When was that?

Mr. KNOWLES. That was in early January. I don't know the exact date. It was roughly the 10th.

Senator BYRD. We are now at the 4th day of February.

Mr. KNOWLES. We are still on schedule.

Senator BYRD. So it will be another couple of weeks?

Mr. KNOWLES. Yes. However, that does not mean the President will lift the suspension in whole or in part at the end of that period of time. I simply cannot state, as I do not know, that even when the review is completed, the President will lift the suspension.

Senator BYRD. I would assume he won't lift it. Are you indicating he may lift his restrictions?

Mr. KNOWLES. I am simply indicating that I do not know——

Senator BYRD. I thought the purpose of the study was to decide whether restrictions should be tighter, not the question of whether they should be lifted.

Mr. KNOWLES. I think we are stating two things. The review should come out with a new set of national security based and possibly foreign policy based licensing criteria. There may be new items under control. There may well be tighter restrictions against which we will run license applications.

Senator BYRD. Are you involved in the review?

Mr. KNOWLES. Yes, sir, I am.

Senator BYRD. You are involved in the review?

Mr. KNOWLES. That is right.

Senator BYRD. I think it appropriate that you should be.

Mr. KNOWLES. The review is being conducted by the Secretary of Commerce personally. If you want an update on what is going on and how it is going I would be glad to ask him to provide answers to that for the record.

Senator BYRD. I am very surprised that you thought the President might lift the restrictions. I was under the impression that the purpose of the review was whether they should be made tighter or not, not whether they should be lifted.

Mr. KNOWLES. I think you are right, Mr. Chairman. That is why I don't want to let it seem as if we are heading in the direction of less restrictions. We are talking, however, on a base of where things were in late December before the decision was made to suspend licenses and licensing. The suspension is in effect pending the outcome of the review which will set forth on a more permanent basis new national security criteria, a new listing perhaps of items under new foreign policy or national security controls, and to complete the negotiations and consultations with our COCOM allies. This review is fairly broad. It will include all general licenses and U.S.-U.S.S.R. trade to see whether those general licenses should be restricted or revised in some way, and will also deal with a few specific projects such as some of the ones you mentioned, plus others.

Senator BYRD. You make a very significant statement, I think, on page 4. You say—

> The nature of incoming applications has increasingly reflected the fact that the composition of U.S. exports is shifting increasingly into high technology areas. Incoming applications are involving steadily more complex systems and technologies which require steadily more sophisticated technical analysis.

That being the case, it seems to me to be very important if we are going to attempt to influence Russia through the use of trade, that all trade—all trade—be embargoed with Russia.

You point out yourself that the nature of most incoming applications have increasingly reflected the fact the exports are shifting increasingly into high technology areas.

Mr. KNOWLES. But the problem of embargoing all trade, Mr. Chairman, is that when one talks about stopping items that are under general license you get very quickly to items for which there is large foreign availability and limited or no potential for improving the Soviet military. You literally get down to pens, pencils, window glass, and items that may be bought anywhere. The effect of totally stopping this trade would be to hurt the U.S. balance of payments and U.S. suppliers, and to keep U.S. businesses from obtaining the profits to build up the industrial base to help strengthen U.S. military potential.

Senator BYRD. Do you think under today's conditions—in light of the invasion of Afghanistan, and in light of what has happened to the American hostages in Iran—that we can afford a business-as-usual policy by our Government?

Mr. KNOWLES. Mr. Chairman, I hardly think we are doing business as usual with Russia. I do not think we will be doing business as usual with Russia. However, I think there is a degree of communication and coordination now with the Defense Department people that I have not seen in the recent past. I have seen more effective cooperation with Defense, in particular during the recent weeks, and I think it will continue. I think business as usual is simply wrong now and will most definitely be wrong at the end of the review.

Senator BYRD. You mention business profits. I guess I am generally considered as not being antibusiness. Some people say I have a rather conservative outlook. But I think we can't worry as much today about business profits. I am worried about the perception that the world has of the United States today. I think we have had a weak and vascillating, a twisting and turning foreign policy, if we can call it a foreign policy. I am concerned that once the President made that determination to embargo grain that we not march up the hill such as he did at that point and then 6 weeks or so later, march down the hill again. I think unless we have some consistency in our policy, some steadfastness, some resoluteness, we are going to find it very difficult to recapture the confidence of other nations. I am just concerned about whether we are actually determined to make Russia pay a price, as the President expressed it, for her aggression.

I am not totally encouraged by your testimony. I am not directing my remarks at you. I know you don't make the policy. I am trying to understand just how far we are going, just what we have done, and what we are likely to do.

Mr. KNOWLES. Well, let me note again that I think business as usual is neither occurring now nor will occur. I will stop with that.

Senator BYRD. Now, in your testimony you say, "The Export Administration Act directs the Defense Department may review any applications." What arrangements do you have with the Defense Department in regard to reviewing applications?

Mr. KNOWLES. They delineate for us the types of applications they would like to see. It may be on a fairly technical basis; that is, any computer over a certain bit-transfer rate for a certain country. Whatever they wish to delineate, they may see. They may revise their request at any time. We are happy to forward to them whatever application or types of applications they would like.

Senator BYRD. Let me see if I am clear now on your testimony.

As I understand it, at the present time and since the early part of January when the statement was made by the President, there have

been no exports of any kind to the Soviet Union. Am I right in that?

Mr. KNOWLES. No. There have been no validated license exports since the licenses were suspended, at least to the best of my knowledge. General license items, that is those not under control for national security or for foreign policy reasons may continue to be exported. Validated licenses items and other explicit export permissions have been suspended. New applications are simply not being processed or granted; that is, those applications which we have received or which we may receive.

Senator BYRD. So, trade is still continuing with Russia?

Mr. KNOWLES. The nonstrategic or nonforeign-policy controlled items may continue to be exported to the U.S.S.R. at the present time, but again those so-called general licenses are under active review at this point.

Again I would note that there is a considerable difference between those items under general license and the grain situation where the United States has considerable leverage over the Soviet economy with respect to grains, beets, and related products, and simply has no significant leverage at all in almost all of the general license items because they are fairly routinely available from foreign sources.

The question of foreign availability and what other items should be put under control on a more permanent basis for export to the Soviet Union is something that is being considered right now by this review group that I mentioned.

Senator BYRD. Thank you very much, Mr. Knowles.

[Mr. Knowles' prepared statement follows:]

PREPARED STATEMENT OF KENT N. KNOWLES, DIRECTOR OF THE OFFICE OF EXPORT ADMINISTRATION, DEPARTMENT OF COMMERCE

I am pleased to appear here today to describe the national security export control system administered by the Department of Commerce, the means by which we enforce compliance with that system and the actions recently taken at the President's direction in response to Soviet actions in Afghanistan. Let me begin with a brief description of the way the existing export control system works.

THE EXPORT CONTROL SYSTEM

Under the authority of the Export Administration Act of 1979, the Commerce Department exercises control over the export of so-called dual-use items. These are items having both civilian and significant potential military applications. We also exercise broad control over the export of technical data. The Act directs that the export of dual-use items and of technical data shall be controlled for three reasons:

1. To protect the U.S. national security,
2. To further significantly the foreign policy of the U.S., and
3. To protect the U.S. domestic economy from the excessive drain of scarce materials and to reduce the inflationary impact of foreign demand.

Dual-use items whose export comes under Commerce's jurisdiction appear on the Commodity Control List (CCL). Most items which are either regarded as having only military applications or which are specifically designed for military use appear on the U.S. Munitions List, which is administered by the State Department.

Only a small portion of U.S. exports require the issuance of a specific "validated" license document by the Commerce Department. By far the great majority of exports are shipped under "General License" authority which allows the exporter to ship freely without applying for a validated license. The commodities that do require a validated license, and which appear on the CCL, fall into three general categories:

1. Those products judged to have the potential of contributing significantl to the military capabilities of potential adversaries. Most of these items a controlled multilaterally by an informal organization called COCOM, con posed of the NATO nations, minus Iceland, plus Japan. A small group a controlled unilaterally by the U.S. because they are considered particular sensitive or because they are uniquely available in the U.S.,

2. Certain items which are controlled for foreign policy reasons, fo example, nuclear-related devices and facilities; oil and gas explorati equipment; crime control and detection equipment, and

3. Petroleum and related products that are controlled for short supp reasons.

Within the Commerce Department, the Office of Export Administration, which I am the Director, is responsible for processing applications for the expo of items on the Commodity Control List and the technical data associated wi them. This represents a large and steadily growing workload, currently runni at a rate of 284 incoming applications per day during FY79, up from 262 p day in FY78, and promising to increase yet further. Moreover, the workload h been growing not only in volume but in complexity as well. The nature of inco ing applications has increasingly reflected the fact that the composition of U. exports is shifting increasingly into high technology areas: incoming applic tions are involving steadily more complex systems and technologies which r quire steadily more sophisticated technical analysis by both Commerce and i advisory agencies and raise ever more difficult export policy issues.

Let me describe briefly the process that an application for the export of item controlled for national security purposes goes through after its arrival OEA. First, it is checked for completeness and logged in by the Operatio Division. Then, applications to export to non-communist destinations are exa ined to identify those of a sufficiently routine nature to enable them to approved and licensed immediately without further review. Applications f Communist destinations and those of a non-routine nature to the non-Communi world are forwarded for review and analysis by a licensing specialist in one OEA's three commodity licensing divisions: The Computer Division, the Ele tronic Equipment Division or the Capital Goods and Production Materia Division.

The licensing specialist examines the application in the light of the followi concerns:

the equipment's uses and function,
its level of sophistication,
its normal pattern of military or civilian use in the United States and el where,
the degree to which similar equipment is freely available elsewhere,
the equipment's suitability for the proposed end-use,
the end-user's known activities,
the possibility that the item might be diverted from the stated end-use less acceptable uses, and
the econo implications of the transaction for the United States.

The Comme licensing specialist will often consult on a informal basis wi experts from other agencies while he is making his analysis.

A small number of cases which closely resemble cases received in the past m be decided at this stage. The large majority, however, are then forwarded, alo with the licensing specialist's analysis and recommendations, to OEA's Poli Planning Division (PPD). Here, the application can follow one of three path

First, PPD may decide it on the basis of agreed-upon delegations authority from other agencies.

Alternatively, it may be referred to one or more advisory agencies (u ally Defense, State, Energy and/or NASA) for their review and reco mendations which PD will carefully consider in deciding the case. T Export Administration Act directs that the Defense Department may revi any application for the export of any goods or technology to any country which exports are controlled for national security reasons. Commerce h worked out arrangements with Defense to ensure that DoD sees all ap cations in which it has an interest.

Third, PPD may decide that the case raises such complex technical and policy issues that it requires full-fledged interagency consideration at t senior staff level in the interagency Operating Committee.

If the case is referred to the Operating Committee and if it proves impossible to reach agreement in that forum, the case may be successively escalated to the Deputy Assistant Secretary level in the "Sub-ACEP" (Advisory Committee on Export Policy), to the Assistant Secretary level in the ACEP and if need be, to the Cabinet level in the EARB (Export Administration Review Board). There is even the provision for escalation to the President should all other forums prove unsuccessful in reaching agreement.

With the exception of a small group of some 44 items that the U.S. controls unilaterally, all of the items on the Commodity Control List for national security purposes are subject to international controls by COCOM. Thus, if the U.S. decides in favor of approving an application to export to a Communist country an item subject to the COCOM embargo, it must obtain the approval of the other COCOM members as well. The U.S. therefore sends a request for an exception to the embargo, together with its reasons for recommending approval of the transaction, to the COCOM headquarters in Paris. Only after unanimous agreement has been reached in COCOM on the case may the application be approved for licensing.

If an application is rejected at any stage, the applicant may appeal to the Assistant Secretary for Industry and Trade. Less than 1% of all incoming applications were rejected in 1978, however.

That is a very brief sketch of the licensing process. Let me add a brief description of the actions the President directed in the wake of the Soviet invasion in Afghanistan.

ACTIONS DIRECTED BY THE PRESIDENT IN EXPORT CONTROL

The President directed the imposition of validated license controls on agricultural exports in the wake of the Soviet armed invasion of Afghanistan in order to show the USSR in tangible ways that aggression is costly and will be met with firmness. The President's directive was initially made applicable to all agricultural commodities and products in order to permit quick action pending review to determine which commodities in addition to wheat and corn could be significant in terms of achieving the purposes of the controls. Preliminary review of the list is now complete. Regulations setting forth modifications to the original blanket restrictions have now been filed with the Federal Register and will appear therein within the next few days.

In an action parallel to the halting of agricultural shipments to the Soviet Union, the President also directed that an overall review be undertaken on an expedited basis of U.S. export control policy to the Soviet Union. Consistent with this directive, the Department of Commerce issued a General Order suspending all outstanding validated licenses to the Soviet Union and suspended issuance of new licenses pending completion of the review. The review is now ongoing under the chairmanship of the Secretary of Commerce, with the participation of senior Executive Branch officials. The review will be completed in the next few weeks.

In light of the Soviet actions, it is incumbent upon the United States to review the criteria it uses to assess the national security implications of its exports to identify accurately those exports which contribute significantly to Soviet military and warmaking potential and are detrimental to U.S. national security. Furthermore, we need to review exports from the U.S. which, although not significant to the Soviet Union because they contribute to their military and warmaking potential, are significant to the Soviets and should be controlled to further U.S. foreign policy interests. Needless to say, despite our concern over Soviet willingness to use their full resources in support of their aggressive actions, there remains a wide range of items that are in fact of negligible importance to the Soviet Union, including its warmaking potential, and ought therefore to remain under general license. The focus of our review is to determine where we need to draw the line between such items and the items which ought to be controlled to the USSR over the long term, and the degree to which our policy on approving items already on the CCL might require tightening.

COMPLIANCE

Let me conclude with a description of the manner in which U.S. export controls are enforced. A compliance mechanism is in place to enforce the President's decisions in the areas of both agriculture and high technology. The Compliance Division of the Office of Export Administration in the Commerce Department has long been responsible for enforcing all existing U.S. export controls in the area

of high technology and will be responsible for the enforcement of the new agriculture controls as well.

The Compliance Division of the Office of Export Administration is responsible for identifying and investigating violations of the Export Administration Act and Export Administration Regulations. The Compliance Division consists of three branches: Facilitation, Intelligence and Investigations.

The Facilitation Branch is staffed with inspectors and document examiners. Inspectors examine cargo about to be exported from the United States. If a suspected violation is identified, the shipment is detained until a determination can be made about the legality of the export. In certain cases where a violation has occurred, the U.S. Customs Service is requested to seize the shipment.

Document examiners review Shipper's Export Declarations forwarded to the Compliance Division from the Bureau of the Census. A number of violations are detected in this manner. In some cases, where the violation is relatively minor, educational letters are sent or telephone calls are made to the violator advising him that a violation has occurred. A record of this contact goes into our files and can have a bearing on any action we take if a subsequent offense occurs. More serious violations are referred to our Investigations Branch.

The Intelligence Branch is staffed with criminal investigators who develop intelligence information regarding areas of possible export control violations. The Branch conducts preliminary investigations into suspected violations and attempts to prevent potential illegal transactions from actually taking place.

The Investigations Branch, which is also staffed with criminal investigators, conducts full-scale investigations into alleged violations. If it is determined that a violation has occurred, and no criminal intent is involved, either a charging letter is recommended or a warning letter is issued to the alleged violator. Cases with criminal potential are referred to the U.S. Attorney's Office for consideration of prosecution.

CRIMINAL AND ADMINISTRATIVE SANCTIONS

The Export Administration Act of 1979 provides for both criminal and administrative sanctions for violations.

Criminal penalties for a willful violation committed with the knowledge that an export will be used for the benefit of any country to which exports are restricted for national security or foreign policy purposes include a maximum fine of five times the value of the exports or $100,000, whichever is greater, and/or ten years imprisonment. Other violations can result in a maximum fine of five times the value of the exports or $50,000, whichever is greater, and/or imprisonment for five years.

The new Act also states that any person who is issued a validated license to exports goods or technology to a controlled country, who has knowledge that the export is being used by the controlled country for military or intelligence gathering purposes contrary to the conditions of the license, and who willfully fails to report this use to the Secretary of Defense, will be fined up to five times the value of the exports involved or $100,000, whichever is greater, or imprisoned up to five years, or both.

Administrative sanctions can also be imposed on violators either in addition to, or in lieu of, any criminal penalties imposed by the court.

Administrative sanctions can be in the form of a fine of up to $10,000 for each violation, and export privileges can be suspended or revoked. The latter type of sanction can include:

(A) Suspension or revocation of validated export licenses;

(B) General denial of export privileges which prevent the participation in any manner in any transaction involving commodities or technical data exported from the United States, or produced abroad by persons subject to U.S. jurisdiction;

(C) Exclusion from practice before the Deputy Assistant Secretary for Export Administration with regard to any matter. This would apply to attorneys, accountants, consultants, freight forwarders and other representatives of exporters.

Whenever the Compliance Division has reason to believe that a violation has occurred, and our Office of General Counsel concurs, a recommendation is made to the Director, Office of Export Administration to issue a charging letter. If the Director agrees with the recommendation, a charging letter is issued which sets out the facts of the alleged violation, the provisions violated and the possible sanctions. The respondent is advised that a hearing can be requested before a Hearing Commissioner and it can be represented by counsel. The Hear-

ing Commissioner decides the case and imposes penalties, or dismisses the case, as appropriate. The decision of the Hearing Commissioner can be appealed to the Assistant Secretary for Trade Administration.

LEVEL OF ACTIVITY

In FY 1979, we referred three cases to the Justice Department for possible criminal prosecution. Two cases were accepted. Our Investigations Branch had approximately 195 cases under investigation in FY 1979 and the Intelligence Branch had approximately 150 preliminary inquiries under consideration. We closed 105 full-scale investigations and 67 preliminary inquiries during this period. We issued 77 warning letters, 24 full-scale investigations were closed due to insufficient evidence or a finding that no violation had occurred, and 14 cases were closed after the completion of compliance proceedings. In the case of preliminary inquiries, 35 were found to require no further investigation and 32 were referred for full-scale investigation.

That concludes my prepared remarks, Mr. Chairman. I shall be happy to answer any questions you may have.

Mr. KNOWLES. Thank you, Mr. Chairman. I would be glad to provide any information for the record at a later point if you would like, or if you have other more detailed questions.

Senator BYRD. I have asked you this before, but just to get a better understanding I will bring it up again. As I visualize it, you would feel that before the end of February there will be decisions made as to whether there will be further restrictions.

Mr. KNOWLES. Yes, sir. That is the President's schedule. It was still on time when I left Washington late Wednesday, and to the best of my knowledge that is still on schedule. The consultations are under way and are continuing with our COCOM allies. Consultations are continuing with respect to grain producing countries. The results of those consultations will be assessed and will be factored into whatever decisions will be made.

Senator BYRD. I wish you would provide the committee with the information which you indicated you would do earlier, namely, what other countries, if any, have embargoed grain shipments to Russia.

My understanding—and my understanding could be wrong, and that is why I wanted to ask an expert like you—is that what these few other countries have done was to say that they will not increase their shipments to Russia; they will not permit their grain to be substituted as an export for the American grain that is not exported. Is that your understanding of what they have done, Mr. Knowles?

Mr. KNOWLES. Yes, sir. That is my understanding as of Wednesday, but I would——

Senator BYRD. Let me put it this way. So far as you know, no other country has taken the step which the United States took; namely, to embargo grain and other agricultural products?

Mr. KNOWLES. I would like to give you an update on that, if I may. I do not know what recent actions Canada, for instance, may have taken. I would like to check on that and provide it for the record, if I may.

Senator BYRD. Yes, sir. I would appreciate that.

[The information follows:]

Australia, Canada, and the EC have agreed not to replace directly or indirectly U.S. grain denied to the Soviets.

Canada has agreed to hold grain export at traditional levels.

Australia has prohibited new wheat commitments and is keeping feedgrains at traditional levels.

The EC has eliminated export restitution for wheat and coarse grains and sharply reduced them for wheat flour, effectively eliminating new sales to the U.S.S.R.

Argentina will not act officially to take commercial advantage of the U.S. action and wishes to maintain its traditional commercial markets.

All four governments are participating in the Exporter's Subgroup monitoring grain trade flows.

Thailand, Greece, and Turkey have also indicated they will not replace U.S. grains.

Senator BYRD. Before calling the next witness, I will ask Mr. Brady to take a seat in the audience, since I may want to have more witnesses at the table.

Mrs. Sharon R. Connelly, Director of the Compliance Division, Office of Export Administration, Department of Commerce, will be the next witness. Welcome, Mrs. Connelly.

STATEMENT OF MRS. SHARON B. CONNELLY, DIRECTOR OF THE COMPLIANCE DIVISION, OFFICE OF EXPORT ADMINISTRATION, DEPARTMENT OF COMMERCE

Mrs. CONNELLY. Thank you.

Senator BYRD. Mrs. Connelly, I understand that you do not have a prepared statement?

Mrs. CONNELLY. No, sir, I do not.

Senator BYRD. That is all right.

How many cases of illegal diversion are presented to your division annually?

Mrs. CONNELLY. I can give you the figures of the cases we received in fiscal year 1979.

Senator BYRD. Thank you. That will be fine.

Mrs. CONNELLY. Eight, sir.

Senator BYRD. Eight cases of illegal diversion?

Mrs. CONNELLY. Those were eight cases that we opened with allegations that an illegal diversion occurred.

Senator BYRD. Now how many of those cases involved Russia or the Warsaw Pact nations?

Mrs. CONNELLY. I don't have that information with me. I can submit it for the record.

Senator BYRD. Would you please? Thank you.

[The information follows:]

Mrs. CONNELLY. [Deleted.]

Senator BYRD. What is the present backlog in processing illegal diversion cases or export impoundments?

Mrs. CONNELLY. I don't have that information with me either. I would be happy to submit it.

[The information follows:]

Mrs. CONNELLY. [Deleted.]

Senator BYRD. Thank you.

Is your staff adequate to process and investigate information given to your office concerning illegal diversions?

Mrs. CONNELLY. Senator Byrd, I believe that we do a very credible job in enforcing the Export Administration Act with the staff that we have. Clearly with additional staff we could have an enhanced enforcement effort. We could take a more aggressive approach to enforcement than we are able to do now. But we certainly do have a very credible deterrent effect on violations of the act.

Senator BYRD. Is the Office of Export Administration currently approving any exports to the Soviet Union which involve validated licenses?

Mrs. CONNELLY. I am not in a position to answer that question. I am the Director of the Compliance Division. That is a licensing question.

Senator BYRD. Very good. Thank you very much.

Mr. Joseph Lucciola, Deputy Director, Compliance Division, Office of Export Administration, Department of Commerce. Do you have a written statement?

STATEMENT OF JOSEPH LUCCIOLA, DEPUTY DIRECTOR, COMPLIANCE DIVISION, OFFICE OF EXPORT ADMINISTRATION, DEPARTMENT OF COMMERCE

Mr. LUCCIOLA. No, sir. I was told I need not prepare one.

Senator BYRD. That is all right. I am told that you and Mrs. Connelly were to testify along with Mr. Knowles, to backstop him, so to speak. I did not realize that.

Let me ask you this. During the past year, has any official at Commerce told you to stay clear of using the word diversion when addressing the Kama River case?

Mr. LUCCIOLA. No, sir. I understand that—let me be more precise. I do not recall ever having been told that, although I did understand that "diversion" and "Kama" did not go well together.

Senator BYRD. Sorry, I couldn't hear.

Mr. LUCCIOLA. I do not recall ever having been told that, sir.

Senator BYRD. Kama River trucks and other Kama River vehicles have been used in the invasion of Afghanistan. In your professional judgment, has there been diversion of the end use products of the Kama River facility?

Mr. LUCCIOLA. That is a rather technical question. It sounds simple but actually is a rather technical question. The technical answer is, in my opinion, based on the information that was made available to me there was no diversion—that can be proven at this time under the Export Administration regulations.

I am sorry for the interruption, Senator, technically there was no diversion.

Senator BYRD. Are you saying that they were not used in the invasion?

Mr. LUCCIOLA. No, sir, that is not what I am saying at all.

Senator BYRD. They were used in the invasion?

Mr. LUCCIOLA. According to the newspapers, they were, sir. What I am saying, if I may just explain a little bit more. We licensed the equipment for the Kama plant. The Kama plant was designed to make trucks. Those trucks are civilian trucks. Our regulations define a

military as opposed to a civilian truck. Because the military uses the truck, according to our regulations, does not make it a military truck. According to our regulations it remains a civilian truck. I grant you that it is only a question of definition. Again according to our regulations it would remain a civilian truck.

Senator BYRD. Let me see if I can put it in perspective. If I am wrong, don't hesitate to say so. The Kama River trucks were used in the invasion of Afghanistan by Russia, but under the technical definition of the Department of Commerce that use was not considered to be a military use?

Mr. LUCCIOLA. Under Interpretation 19 in the Export Administration regulations which defines a military truck as opposed to a civilian truck, the trucks produced at Kama would fall into the category of civilian trucks.

Senator BYRD. Do you think there should be reappraisal of resolution 19?

Mr. LUCCIOLA. It is Interpretation 19.

Sir, I just help enforce the regulations. I don't write them, sir.

Senator BYRD. I understand you investigated the Kama River matter.

Mr. LUCCIOLA. I did, with the assistance of two other investigators.

Senator BYRD. Did you go to the plant? How do you investigate something like that?

Mr. LUCCIOLA. Well, no, sir we did not go to the plant. What we did was to look through all the documents that we were given that dealt with the Kama River situation. We talked to people who were associated with the Kama River situation.

Senator BYRD. People associated with the Kama River situation? What people would those be?

Mr. LUCCIOLA. Well, you have to excuse me, Senator. This is my first time testifying. And I have a little bit of a problem because normally we don't discuss an investigation and I don't know whether I have the authority to really go into a Department of Commerce investigation that hasn't been completed yet. I am trying to answer your questions.

Senator BYRD. You discuss whatever you need to with your superior or superiors there. I don't want to get into anything that might reflect adversely or improperly or unnecessarily on any groups during an open session. I am just curious as to how you make an investigation of a plant in Russia.

Mr. LUCCIOLA. You do the best you can, Senator.

Senator BYRD. I appreciate the fact that you haven't testified before, and I will take that into consideration. Go ahead, Mr. Knowles.

Mr. KNOWLES. Mr. Chairman, if I could just help a bit here.

The Compliance Division obviously can't go to Russia and investigate the plant. Their responsibility is investigating possible violations by any person subject to the jurisdiction of the United States and for turning up whatever evidence and facts they can. It would be nice if we could go to the Kama plant but this division does not have that capacity.

Senator BYRD. I assume nobody in our Government has ever been to the Kama plant. Is that correct?

Mr. KNOWLES. There was a visit by U.S. Embassy personnel over there in about April of 1979. I did not check this morning to see whether they had been back to the Kama plant since. The people that shipped the computer to that plant also have responsibility for reporting on a regular basis with respect to the computer. Those reports are received. The Department also received intelligence information from a variety of sources.

Senator BYRD. Let me ask the question of you that I asked to the previous witness. Do you think that interpretation 19 should be changed?

Mr. KNOWLES. We would be happy to look at it, Senator, particularly in light of the Afghanistan situation. We would be happy to look at that and in fact any other interpretation that might pertain to Russia. I have no feeling that the regulations are immutable. Far from it. The system can change. It is flexible to accommodate changes in policy. We would be happy to take a look at it.

Senator BYRD. I find it rather interesting that trucks which everyone admits were used for a military purpose, are under the regulations or the interpretations of the Department of Commerce not considered military equipment. That brings to my mind how many other such products are there that the Commerce Department does not consider military in nature, but which in fact are used for military purposes?

Mr. KNOWLES. Well, being essentially new management I am in the position to say we will look at this, I have no feelings the regulations are immutable. We do intend to review them thoroughly. What has been licensed in the past may not be licensed in the future. The system is flexible enough to do that. During the course of the review I mentioned earlier not only general licenses but any interpretation of this nature may be looked at and examined carefully with the views of the Department of Defense very much in mind. We will also take a look at the regulations to see whether anything should be changed.

Senator BYRD. Mr. Lucciola, during your investigation of the Kama River matter were you allowed access to all the material related to it?

Mr. LUCCIOLA. To the best of my knowledge that is generally correct. We received a mass of material from various sources and our investigation was limited to the material that we received from those sources it was decided that we should contact. We also requested some files from the Office of the Secretary.

Senator BYRD. Did you get those files?

Mr. LUCCIOLA. I was on leave when those files were made available but I understand the other two investigators working with the case did review those files. I can only believe that in this instance, as in other instances, all of the files were given to us.

Senator BYRD. Mr. Knowles, could you describe how and through whom an investigation is made?

Mr. KNOWLES. I think Sharon Connelly and Mr. Lucciola would be better witnesses to answer that. I can say the investigators have had access to whatever material they felt was relevant.

Senator BYRD. Is that within the Department, or outside of the Department?

Mr. KNOWLES. Yes, sir, they may go outside the Department. They may go wherever they wish. I would expect Mrs. Connelly or Mr.

Lucciola to come to me if there was anything they needed. Indeed, I understand they interviewed Dr. Verona of DIA. The investigation would have been completed several weeks ago but for the fact they wanted to interview at least one witness who had retired, plus Dr. Verona, to get access to other information, and to obtain material from the Central Intelligence Agency. They operated basically on their own schedule.

I have had no information from anyone that there was anything else the investigators would like to see that they felt relevant.

Senator BYRD. Well, as an investigator, what were you looking for; what were you seeking to determine when you made the investigation of the Kama River plant?

Mr. LUCCIOLA. Well, we were told, Senator, to look at the documents we were given that involved the Kama River plant and the exports that went to Kama and determine if there were any violations of the Export Administration Act. There were certain other parameters in the case. For example, the IBM portion, I was later told, was being looked at by the Office of the General Counsel so that did not become a part of our investigation.

Senator BYRD. You say the IBM portion.

Mr. LUCCIOLA. Yes sir, the IBM portion. There was some IBM equipment at Kama and that portion of the case was looked at by the Office of the General Counsel not by our staff.

Senator BYRD. Thank you very much.

The next witness is Dr. Garber, Deputy Under Secretary of Defense, International Programs and Technology, Office of the Under Secretary of Defense for Research and Engineering. Welcome, Dr. Garber.

STATEMENT OF VITALIJ GARBER, DEPUTY UNDER SECRETARY OF DEFENSE, INTERNATIONAL PROGRAMS AND TECHNOLOGY, OFFICE OF RESEARCH AND ENGINEERING, ACCOMPANIED BY JAMES HOWER, U.S. NAVY, INTERNATIONAL PROGRAMS AND TECHNOLOGY

Dr. GARBER. Good morning. Mr. Chairman, if I may, I would like to make a verbal summary statement and the written statement will be offered for the record.

[The prepared statement of Vitalij Garber follows:]

PREPARED STATEMENT OF DR. VITALIJ GARBER, DEPUTY UNDER SECRETARY OF DEFENSE (INTERNATIONAL PROGRAMS AND TECHNOLOGY)

Mr. Chairman and Distinguished Members of the Subcommittee on General Procurement, I am pleased to have the opportunity to review with you the Defense aspects of export licensing procedures as they relate to Commerce Department—administered Commodity Control List and the State Department—administered COCOM and Munitions Control Lists.

I am accompanied by Dr. Ellen Frost, Deputy Assistant Secretary of Defense for International Security Affairs (International Economic Affairs) and Dr. Oles Lomacky, Director for Technology Trade in my office.

From discussions between our staff officers it appears that your subcommittee is interested in becoming more knowledgeable regarding the Defense aspect of export licensing procedures. Accordingly, this presentation will cover:

The role, responsibilities and objectives of the Department of Defense in export control matters, including the evaluation of U.S., COCOM, and Munitions Control export license applications.

The reorganization of Defense export control functions, including assignment of personnel resources.

The identification of military critical technologies and of measures to control technology transfer.
Criteria for assessing likelihood of diversion.
Kama River Truck Plant.

DEFENSE ROLE, RESPONSIBILITIES, AND OBJECTIVES

As for the role and responsibilities of the Department of Defense in export control matters concerning dual use (military/commercial) products and technologies, these are set forth in the Export Administration Act of 1979. While the Department of Commerce is charged with administering the Act, Defense has the responsibility for advising that department on the national security considerations of individual license applications of U.S. and COCOM exporters. By COCOM I mean the Coordinating Committee which is an unofficial alliance of Free World countries consisting of the NATO countries less Iceland and plus Japan, which acts in concert to review its member's applications for licenses to export strategic goods and technologies to Warsaw Pact and PRC destinations. One important duty of the Secretary of Defense set forth in the Act is to bear primary responsibility for developing a list of military critical technologies to insure that they and the mechanisms through which they may be effectively transferred are controlled. In developing this list, he is charged with giving primary emphasis to (a) arrays of design and manufacturing know-how, (b) keystone manufacturing, inspection, and test equipment, and (c) goods accompanied by sophisticated operation, application, or maintenance know-how, which are not possessed by countries to which exports are controlled and which, if exported, would permit a significant advance in the military system of any such country. Congress has directed that the initial version of this military critical technologies be completed no later than 1 October 1980, and we will meet this deadline. I'll get back to military critical technologies later.

Another important duty of the Secretary of Defense set forth in the Act is to review any proposed export of any goods or technology to any country to which exports are controlled for national security purposes and, whenever, he determines that such export will make a significant contribution, which would prove detrimental to the national security of the United States, to the military potential of any such country, to recommend to the President that such export be disapproved. The importance of the Defense role in export matters is reflected by the stipulation in the Act that, if the President should decide to overrule or modify such a Defense recommendation, he must promptly notify Congress. Because Commerce and Defense are able to agree between themselves on export applications, it has not been necessary to use this authority.

Secretary Brown in his 26 August 1977 "Interim DoD Policy Statement on Export Control of United States Technology" (attachment 1) emphasized that:

"Defense's primary objective in the control of exports of U.S. technology is to protect the United States' lead time relative to its potential adversaries in the application of technology to military capabilities."

Export control selectively exercised is a key ingredient in our effort to positively affect the future military balance between ourselves and potential adversaries. Export control is one of the four principal mechanisms available to us to maintain our present qualitative military advantage over the Soviet Union and others and to reverse the currently worsening numerical military imbalance between ourselves and the Soviet Union. The four primary mechanisms are:

Real increases in our research, development, and acquisition resources.
Improved armament cooperation with our NATO allies.
Direct support to enhance and exploit our fundamental domestic advantage in commercial technology and in our unsurpassed diverse industrial base.
Controls over the export of military critical technologies and critical products of direct military significance.

It is in this context that we in DoD view controls on export of technology and production know-how. Subject to the primary objective that I mentioned above, we wish to minimize controls on exportable end products to expedite processing of export licenses for such goods and services that would not run counter to the objective.

REORGANIZATION OF DOD EXPORT CONTROL FUNCTIONS

Former Secretary Duncan noted that key functions and responsibilities were fragmented among several organizations within the Office of the Secretary of Defense. The realignment has the objective of strengthening both policy and

operating aspects of export control and response to licensing requests. Attachment 2 is the text of Secretary Duncan's request for realignment.

A separation of the policy and operating aspects of the Defense Department's responsibility for reviewing the export of U.S. and COCOM technology and products, as approved by then Deputy Secretary Duncan's 22 August 1979 memorandum (attachment 3), has been in effect since 1 October 1979. Under this reorganization, responsibility for U.S. and COCOM technology transfer policy and export control case processing was transferred from ISA to the USDR&E. Policies concerning international security, political, and economic aspects of technology export issues and actions will continue to be established by ISA.

In general, we anticipate that ISA will continue to participate in the resolution of any cases or issues which, by virtue of their precedential nature, political content or economic impacts, could involve modifications to or new interpretations of established international security or foreign policy commitments.

ISA will also take the lead on broad international security issues of which technology transfer decisions are a part.

Listed below are the nine responsibilities of the Deputy Under Secretary of Defense (International Programs and Technology) :

Processing Munitions Cases.

Processing Allied Strategic Trade Cases.

Processing U.S. Strategic Trade Cases.

Identifying Critical Technology on a continuing basis.

Managing International Cooperation in Research, Develpoment and Acquisition.

Approving Data Exchange Agreements and Information Exchange Projects.

Reviewing Scientific and Technology Agreements.

Reviewing the technical implications of FMS Cases, Reciprocal Procurement MOU's, and other similar agreements.

Reviewing the international implications of Industrial and Information Security policy as it pertains to technology control.

The plan under which we are now functioning is presented affixed to attachment 3.

The underlying premise in the DoD organization for handling technology trade matters is that we draw on all of the resources in DoD—those in the Military Departments, in the rest of the technical offices that comprise the Office of the Under Secretary of Defense for Research and Engineering, the Defense Intelligence Agency, and the Defense Advanced Research Projects Agency. We continue to be supported by industry through both voluntary and contractual relationships.

The identity of offices and individuals evaluating and deciding upon export license applications is contained in attachment 4.

It shows the organization of my office. Not shown on that figure is Dr. Ellen Frost, Deputy Assistant Secretary of Defense and Regional Deputy Assistant Secretaries in ISA. They will support USDR&E with the requisite political and economic analyses. Within this organization, case processing of dual use technologies, goods and technical date that are covered by COCOM and the Commodity Control List (CCL) resides in the office of Dr. O. Lomacky, Director of Technology Trade.

There is, of course, close liaison with the Office of Technology Sharing, which handles munitions list cases and data exchanges.

Single points of responsibility and well-defined communications channels are the features of this organization that we believe will provide both timely decisions and thorough and precise technical evaluations of export license applications.

The functions involved in Export Control in the Department of Defense are extremely demanding of high quality personnel resources. Even without the stresses imposed by the President's response to Soviet aggression in Afghanistan, the organization created in 1979 to focus Export Control management is nearly overwhelmed by the duty case load of export license application processing, the technically demanding activities associated with the current negotiations concerning the COCOM list review, the policy review of export control resulting from the Soviet invasion of Afghanistan, and the response to the mandate from Congress to develop a list of military critical technologies. This last requirement stems from the Export Administration Act of 1979. To redress the resource shortfall it is our intention to ask for relief in the FY 80 Supplemental Budget and in the FY 81 budget request.

One of the reasons for our reorganization in this area of export control was the recognition that the Services and industry were competing the spade work that had to be done in order to implement Fred Bucy's recommendations. Secretary Brown had declared his policy in his Interim Policy Statement (attachment 1). We saw that the time had come to bring activities over which we were exercising oversight into the line organization.

The new organization reflects the fact that the critical technology project had evolved to the point where a full-time line management requirement existed. We have filled this requirement with experienced individuals and continue to draw upon those who guided the effort prior to the reorganization.

Prior to the reorganization, case processing responsibilities were divided between ASD (ISA) and several offices in USDRE. The reorganization concentrates those responsibilities so that all of the technical, programmatic, and combat effectiveness inputs needed for decisions can be more efficiently obtained.

IDENTIFICATION OF MILITARY CRITICAL TECHNOLOGIES AND OF THE MEASURE TO CONTROL TECHNOLOGY TRANSFER

Following delivery of the Report on Export of U.S. Technology by the Defense Science Board in 1976, processes were set in motion to bring to the point of implementation a change in the approach to controlling technology export that concentrates on technology rather than end products.

The Military Service provided lists of the critical technologies that were embedded in current and projected weapons systems. Combinations of the 800 plus candidate critical technologies resulted in a working list of some 138 that were generally divided among some 24 classes. This was completed in late 1977.

In early 1978 a subset of 9 of these critical technology areas was referred to Industry for further refinement Dr. Ruth Davis requested industry to form 9 Critical Technology expert Groups (attachment 5) to refine further the lists of component critical technologies and to begin the processes of identifying those technology components that were already available to a potential adversary, either indigenously or by trade with a third country with whom the U.S. had no agreements that restricted trade in that technology. This voluntary effort by America's leading industrial technologists provides one of the points of departure for our response to the mandate of the Export Administration Act of 1979.

During 1978 and 1979 some 13 (attachment 6) panels of U.S. Government technologists were convened by the Department of State to review the COCOM list. These Technology Task Groups (TTG's) were asked to emphasize technology control to the extent possible within the formats used by the COCOM partners. The specifications that appear on the COCOM list are highly technical and specific to performance or capacity. In some cases our agreements with our COCOM partners do not admit controls on technology transfer mechanisms such as data on scientific information but hold only for end products. The results of the TTG's provide another basic starting point for our current effort.

The Department of Commerce is supported formally by industry in the review of export control procedures by Technical Advisory Committees (TAC's). Both the deliberations of these committees and the experience in technical matters that the individual participants have are being sought in our Critical Technology implementation project.

Mechanisms exist within DoD to exploit the resident technical and military expertise in the Military Departments, the Intelligence Community, the Defense Advanced Research Projects Agency, and the Defense Nuclear Agency. We will also draw upon resident expertise in the Departments of Commerce, Energy, CIA, NASA, as appropriate. Within DoD, for example, the Navy has created a critical technology project organization that exploits the technical expertise of the Navy Laboratory and their contractors in support of the overall DoD effort.

We have established a project office that is responsible for the critical technology lists called for in the Export Administration Act of 1979. Principal support to that office comes from the Institute for Defense Analyses who will coordinate working teams drawn from government and industry to complete the processes begun by the TTG's and the CTEG's. The teams will begin their work this month. We will have significant results by October 1980 but we see this process as a continuing one. That is one of the reasons for developing a resident capability in IDA, acting in its role as a Federal Contract Research Center.

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CRITERIA FOR ASSESSING LIKELIHOOD OF DIVERSION

I would like to itemize the criteria that we use to assess whether the likelihood of diversion from the stated civil end use to a military use is sufficient to recommend denial. The criteria are:

1. Is the item appropriate (in quantity, quality, demonstrable design, etc.) to the stated civil end-use?
2. Is there any evidence that the stated end-user is engaged in military or military support activities to which this item could be applied?
3. How difficult would it be to divert this item to military purposes?
4. Could such diversion be carried out without detection?
5. Is there evidence of a serious deficiency in the military sector which this item, if diverted, would fill?
6. Is technology of military significance not already available extractable from this item?
7. Can safeguards be imposed to prevent a presumed diversion?

Trucks are not the only example of products that are civilian or military depending upon which agency is using them. Boats, light aircraft, gasoline, even food are all products capable of diversion. The important judgments on items like these rests on criteria 5, 6, and 7 in the above list.

When we get to technology we have to make judgments about whether our adversary might pursue a given military development course of action and the significance to U.S. National Security objectives if his pursuits were successful and deployed in numbers.

KAMA RIVER TRUCK PLANT

In August 1971 the USG made the decision to approve licenses for export of machinery and equipment to the Kama River Truck Plant in the USSR. Subsequently during the period 1971–1975, U.S. equipment and technology, valued at about $355 million, was shipped to this plant.

Included was an IBM 370/158 computer system whose purpose was to control the foundry production portion of the complex as well as to process administrative data pertaining to production. The computer license contained several safeguard conditions, including one requiring that the computer itself be used for civil applications only. This condition was designed to prohibit diversion of the computer system's capacity rather than to restrict the use of the products made at the plant. Regular checks made at the plant since the system was installed in 1975 have not uncovered any evidence that it has been used for other than the approved applications.

On the other hand, restrictions to be imposed on which organizations could use the trucks produced at this plant were not explicity negotiated. Although the decision to support this plant and not seek end use controls may have been acceptable during that period of detente, persistent reports that Kama River trucks are being incorporated in large quantities into the Soviet Army coupled with the callous attitude of the USSR as reflected in the large scale use of these trucks in its invasion of Afghanistan raised serious questions as to whether it was a correct decision as well as whether it should be rescinded. Accordingly, after a thorough review of the facts, it was determined on 21 January 1980 that licenses for export of parts and components to support the IBM 370/158 computer system installed in the Kama River Truck Plant foundry should be revoked. The Department of Defense fully endorses this decision.

ATTACHMENT 1

SECRETARY OF DEFENSE,
Washington, D.C., August 26, 1977.

Memorandum for the Secretaries of the military departments; Chairman, Joint Chiefs of Staff; Director, Defense Research and Engineering; Assistant Secretary of Defense (Comptroller); Assistant Secretary of Defense (International Security Affairs); General Counsel of the Department of Defense; Assistant to the Secretary for Atomic Energy; Director, Defense Advanced Research Projects Agency; Director, Defense Intelligence Agency; Director, Policy Review.

Subject: Interim DOD policy statement on export control of United States technology.

1. PURPOSE

This memorandum of policy sets forth the definitions and provides interim internal guidance to the Department of Defense with regard to the DoD role in support of US Government efforts to control exports of critical US technology and related products.

2. BACKGROUND

U.S. policy on international trade consists of two elements that are not always reconcilable: 1) to promote trade and commerce with other nations, and 2) to control exports of goods and technology which could make a significant contribution to the military potential of any other nation or nations when this would prove detrimental to the national security of the United States. While the Defense Department's chief concern is with the second of these goals, it must discharge its concern without restricting U.S. trade and exports any more than necessary.

Defense's primary objective in the control of exports of U.S. technology is to protect the United States' lead time relative to its principal adversaries in the application of technology to military capabilities. This lead time is to be protected and maintained as long as is practical, in order to provide time for the replenishment of technology through new research and development. In addition, it is in the national interest not to make it easy for any country to advance its technology in ways that could be detrimental to U.S. interests. These controls, however, are to be applied so as to result in the minimum interference in the normal conduct of commercial trade. This policy statement, drawing upon the recommendations of the Report of the Defense Science Board Task Force on Export Control of U.S. Technology (the "Bucy Report"), provides interim internal guidance to the Defense Department to maximize the above objectives to the maximum practical extent.

3. DEFINITIONS

The term "critical technology" as used herein refers to the classified and unclassified nuclear and non-nuclear unpublished technical data, whose acquisition by a potential adversary could make a significant contribution, which would prove detrimental to the national security of the United States, to the military potential of such country—irrespective of whether such technology is acquired directly from the United States or indirectly through another recipient, or whether the declared intended end-use by the recipient is a military or non-military use.

"Technical data" means information of any kind that can be used, or adapted for use, in the design, production, manufacture, utilization, testing, maintenance or reconstruction of articles or materials. The data may take a tangible form, such as a model, prototype, blueprint, or an operating manual, or they make take an intangible form such as technical service.

Control of such critical technology also requires the control of certain associated critical end products defined as "keystone" that can contribute significantly in and of themselves to the transfer of critical technology because they (1) embody extractable critical technology and/or (2) are equipment that completes a process line and allows it to be fully utilized.

4. DEFENSE DEPARTMENT POLICY IN EXPORT CONTROL OF U.S. TECHNOLOGY

In assessing and making recommendations upon those export applications referred to it by the State and Commerce Departments, Defense will place primary emphasis on controlling exports to any country of arrays of design and manufacturing know-how; of keystone manufacturing, inspection and test equipment; and of sophisticated operation, application or maintenance know-how.

In order to protect key strategic U.S. lead times, export control of defense-related critical technology to all foreign countries is required. To this end, Defense will:

(1) request the Department of Commerce to alter existing regulations so as to require a validated license for proposed exports of critical technology to all destinations;

(2) recommend to, and support the negotiation by, the Department of State with COCOM countries, and such other nations as may be appropriate, of new measures to control or restrict the flow of critical technology to Communist

countries, as well as recommendations as to the revision of the list of embargoed products.

(3) recommend to the Secretary of Commerce that procedures be streamlined in such a way as to minimize delays in forwarding and processing export applications by a) speeding referral by Commerce of export applications for review and b) making use of new and/or improved technical guidelines to be supplied by DoD, which will allow maximum emphasis to be placed upon applications for the export of critical technologies and associated end products, thereby also allowing more rapid processing of applications for other, non-critical end products.

Defense will support the transfer of critical technology to countries with which the U.S. has a major security interest where such transfers can (1 strengthen collective security, 2) contribute to the goals of weapons standardization and interoperability, and 3) maximize the effective return on the collective NATO Alliance or other Allied investment in R&D.

In assessing the advisability of the transfer of critical technology to either COCOM or other non-Communist countries, Defense will carefully assess the proposed recipient's intent and ability to prevent either the compromise or the unauthorized re-export of that technology. Where classified information is involved, security classification guidance will be provided to the recipient, and where feasible, security surveys will be accomplished in addition to the completion of appropriate military and industrial security arrangements.

The Department of Defense will look to the State and Commerce Departments and the intelligence and security communities to identify those instances in which the initial recipient makes unauthorized further transfers, or allows compromise, of critical technology. The Department will incorporate the results of such observations in its assessments of subsequent applications for commercial export, Foreign Military Sales (FMS), Data Exchange Agreements (DEA), Information Exchange Programs (IEP), and other transfers to such recipients. Violations of U.S. third-country transfer prohibitions or instances of compromise will normally be considered grounds for employment of sanctions involving critical technologies. Coordination within DoD will be strengthened to meet the requirements of military and industrial security.

Defense will normally recommend approval of sales of end products to potential adversaries in those instances where (1) the product's technology content is either difficult, impractical, or economically infeasible to extract, (2) the end product in question will not of itself significantly enhance the recipient's military or warmaking capability, either by virtue of its technology content or because of the quantity to be sold, and (3) the product cannot be so analyzed as to reveal U.S. system characteristics and thereby contribute to the development of countermeasures to equivalent U.S. equipment.

There shall be a presumption for recommending disapproval of any transaction involving a revolutionary advance in defense-related technology to the proposed recipient country (if the resultant military capability threatens U.S. interests). Defense will assess a proposed export of technology not on the basis of whether the item is obsolete by U.S. standards, but on whether the proposed export would significantly advance the receiving country's potential and prove detrimental to the national security of the United States.

End-use statements and safeguards are not to be considered a factor in approving exports to potential adversaries of critical technologies and products except as may otherwise be provided in Presidential directives. Departure from this procedure will occur only with specific approval of the Secretary of Defense, or his designee.

Defense recommendations to approve the export of end products to potential adversaries are to be made primarily on the basis of an assessment that the products' inherent performance capabilities, or the quantity sold, do not constitute a significant addition to the recipients' military capability which would prove detrimental to the national security of the United States.

This policy shall be applied without regard to whether the exporter is a government department or agency, a commercial enterprise, an academic or non-profit institution, an individual entrepreneur, or in the case of re-export requests, a foreign government or an international organization; and without regard to the transfer mechanism involved, e.g., turnkey factories, licenses, joint ventures, training, consulting, engineering documents and technical data.

Explicit account shall be taken of the relative efficiency of the various mechanisms of technology transfer (e.g., foreign liaison activities, scientific and tech-

nical exchanges, commercial visits, trade fairs, training programs, sales proposals and consulting agreements, as well as in specific technology export cases). When the potential for inadvertent transfer of critical technology is considered to be high, Defense shall formulate and recommend to the responsible agencies restrictions on the amount, extent or kind of interpersonal exchange in a given transaction. Visitor control mechanisms within the Department of Defense will be improved.

The Department of Defense, in coordination with other Departments and Agencies, shall identify and maintain a continuously updated list of specific critical technologies and/or end products whose export should be restricted for reasons of national security. This list and its updates will be communicated to Departments responsible for administering U.S. export controls. It is recognized that these list items will be time-dependent. Appropriate items will be added and/or deleted from the list as times goes by.

In coordination with and assisted by the intelligence community, Defense will undertake to improve the information and data base pertaining to technology transfer by studying in greater depth and on a continuous basis selected aspects of U.S. technology transfers over time in order to ascertain their impact on the military capabilities of potential adversaries and on critical U.S. lead-times.

In the interagency arena, Defense will propose and support means by which national security considerations can be taken fully into account from the beginning stages of any international projects having the potential of promoting the transfer of critical technologies.

The Department of Defense will propose and support means of improving interagency communication and coordination on matters of export controls and technology transfers in order to help achieve adequate and appropriate interagency coordination in these areas.

HAROLD BROWN.

ATTACHMENT 2

DEPUTY SECRETARY OF DEFENSE,
Washington, D.C., May 19, 1979.

Memorandum for Under Secretary of Defense for Research and Engineering; Assistant Secretary of Defense (International Security Affairs); Deputy Assistant Secretary of Defense (Administration), OASD(C).

Subject: Export of technology and technology products.

For some time Secretary Brown and I have been reviewing Department of Defense policy responsibilities, organizational structures, and management arrangements for controlling the export of technology and technology products, including COCOM, to foreign nations.

Under current arrangements, key functions and responsibilities are fragmented among several organizations within the Office of the Secretary of Defense. Broad policy and political considerations and the processing of export requests are assigned to several offices within the ASD (International Security Affairs). Technological matters are assigned to two separate offices within the USD (Research and Engineering).

I believe it is essential that we strengthen both the policy and operating aspects of this program. Accordingly, I have decided that the following realignment should occur:

Policy and political considerations will be centralized in one office within the ASD (International Security Affairs).

Technological matters and the processing and coordination of export requests will be consolidated within a new Deputy Under Secretary of Defense for Research and Engineering (Technology Trade). This office will also serve as the DoD focal point on all aspects of export technology, including COCOM, with the Department of State and other Federal agencies.

The USD(R&E), in coordination with ASD(ISA) and the DASD(A) should prepare an implementation plan to be submitted to me before June 30. The plan should consider:

(a) dual-uses military technology and products;
(b) all categories of munitions;
(c) FMS cases;
(d) international S&T agreements, national disclosure policy issues;

(e) responsibilities of DoD in this area regarding appearances in Congress, COCOM discussions, interagency and White House Boards and Councils;

(f) foreign policy issues related to technology transfer (e.g., third country sales);

(g) NATO technical issues (e.g., RSI) and propose a clear and unequivocal assignment of responsibilities.

Disagreements should be recorded and referred to me for resolution.

Personnel ceilings and assignments must be defined, space problems resolved. No increase in the presently authorized personnel ceilings will be acceptable.

CHARLES W. DUNCAN, Jr.

ATTACHMENT 3

DEPUTY SECRETARY OF DEFENSE,
Washington, D.C., August 22, 1979.

Memorandum for Under Secretary of Defense for Research and Engineering; Assistant Secretary of Defense (International Security Affairs); Deputy Assistant Secretary of Defense (Administration), OASD(C).

Subject: Implementation plan to activate the new organization of Deputy Under Secretary of Defense for Research and Engineering (International Programs and Technology).

I have reviewed the plan submitted in response to my directive memorandum of 19 May, subject: Export of Technology and Technology Products. I approve the transfer of responsibilities and billets as specified in the plan. Action will be taken by DASD (Administration) to transfer the necessary billets as specified in the plan.

The new organization will be effective immediately. Personnel transfer will be completed within 15 days and physical space accommodations completed within 30 days from the date of this memorandum.

CHARLES W. DUNCAN, Jr.

ATTACHMENT B

THE PLAN

General. This paper presents a plan for consolidating the currently fragmented responsibilities for technology control together with those of the OUSDRE Director, International Programs in a new Office of the Deputy Under Secretary, International Programs and Technology. Dr. V. Garber will be designated the new Deputy Under Secretary of Defense.

Responsibility. The primary responsibilities of the new office are summarized as follows:

Processing Munitions Cases.
Processing Allied Strategic Trade Cases.
Processing U.S. Strategic Trade Cases.
Identifying Critical Technology on a continuing basis.
Managing International Cooperation in Research, Development and Acquisition.
Approving Data Exchange Agreements and Information Exchange Projects.
Reviewing Scientific and Technology Agreements.
Reviewing the technical implications of FMS Cases, Reciprocal Procurement MOUs, and other similar Agreements.
Reviewing the international implications of Industrial and Information Security Policy as it pertains to technology control.

While the functional responsibilities are assigned to the new DUSD no attempt has been made to dictate how these responsibilities should be carried out. The new office will have the continuing task of solving the problems stated or implied in the tasking memorandum.

Authority. The new Deputy Under Secretary will task established offices in the Office of the Secretary of Defense, the Military Departments, the Joint Chiefs of Staff and other Defense Agencies for specialized advice and assistance rather than unnecessarily duplicating such resources.

Inter-Agency Relationship. The new Deputy Under Secretary will be the primary DoD focal point with the Departments of State and Commerce and other Federal Agencies for technology control matters, but he will mandatorily coordinate with ISA on policy-significant cases (e.g., proposed transfer to the PRC). Similarly the new Deputy would be the primary representative on the

Interagency Advisory Committee on Export Policy, the Economic Defense Advisory Committee and other bodies considering technology export cases, but on the broader issues involving international security policy an ISA representative would participate with the new Deputy during interagency deliberations. The other interagency relationships of ISA including responsibility for FMS cases are not changed.

Internal OSD Relationships. The new Deputy Under Secretary will coordinate and exchange information with other DoD organizations having collateral or related functions. The following OSD organizations shall coordinate with the new DUSD all technological, programmatic and combat effectiveness matters in the areas indicated:

DSAA—FMS Cases and related functions on significant or specifically identified systems and data

ISA—International Agreements involving research, development or acquisition

DUSD(PR)—Industrial and Information Security matters involving international technology control

Personnel. Existing resources will be used as follows to establish the office of the new DUSD:

Military	5
Professional	10
Administration	8
Executive trainees/service provided	6
Total	29

Organization. A tentative organization for the new office is attached (Atch 1). Changes may be made by the new Deputy Under Secretary as implementation progresses.

Functions. Major functions to be performed by the new DUSD are detailed below:

Munitions Cases (State): Technical review; Interface with State; Munitions list review.

Allied Strategic Trade (State): Working Group I; Economic Defense Advisory Committee; Technical Review; Interface with State; COCOM List.

U.S. Strategic Trade (Commerce): Inter-agency Operating Committee; Commodity Control List; Assistant Secretary Appeal Group; Interface with Commerce; Technical Review; Technical Advisory Committees.

Critical Technology: List Development; Interface with other Government Agencies.

Data Exchange Agreements/Information Exchange Projects (ABCA): Administration.

S. & T. Agreements: Technical Review; Interface State.

Cooperative International Research, Development: International Meetings; International Travel; International Agreements; Foreign Weapon Evaluation Coordination.

Technology Transfer Data Base & Studies: Technical Guidance; Finance.

FMS Cases: Programmatic Review; Technical Review; Disclosure Guidelines (DDLs) Approval.

Reciprocal MOU's: Technical Implications.

Technical Cooperation Program (ABCA): General Overview.

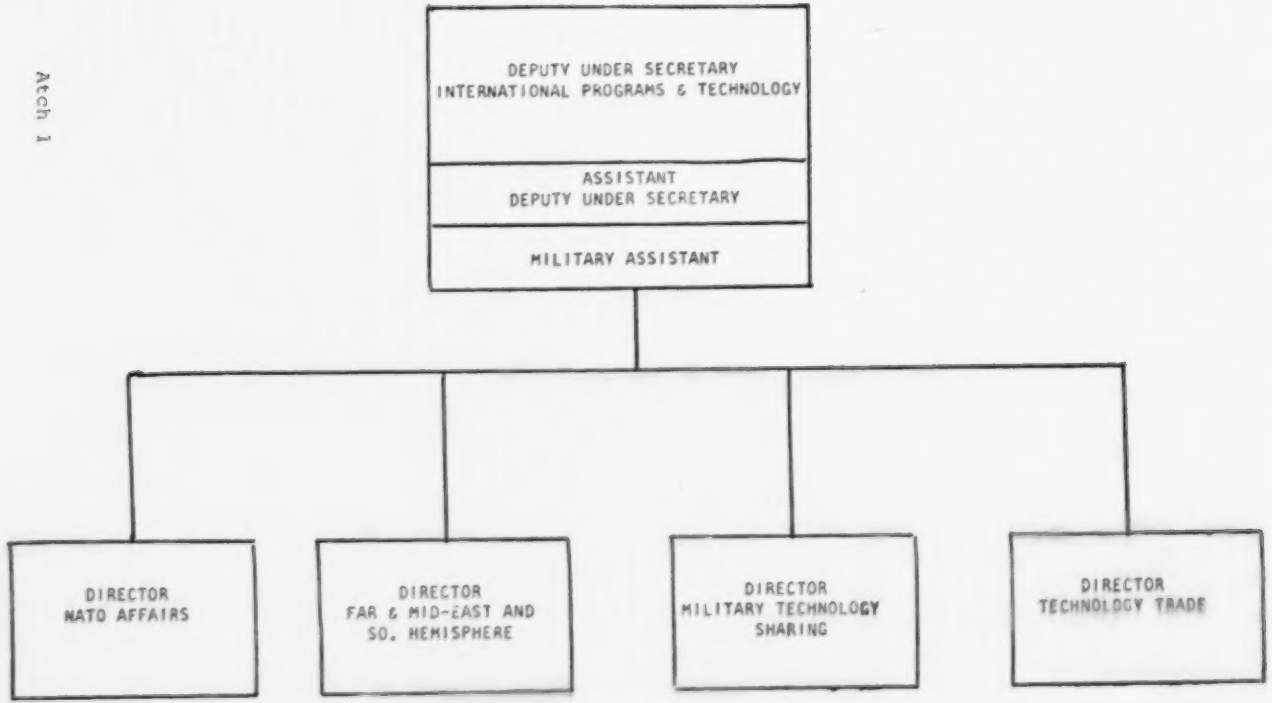
Defense Research Group (NATO): General Overview.

Industrial & Information Security: Coordination.

SUMMARY

As Deputy Under Secretary, Dr. Garber will administer the control of technology export for the Department of Defense (DoD). He will be the DoD focal point for technology transfer policy and all activities involving munitions and commercial export cases, and for the identification of critical technologies involved in exports to foreign nations. He will continue to be responsible for international research and engineering activities, including cooperation with our NATO allies in defense research, development and weapons acquisition.

Atch 1


DEPUTY UNDER SECRETARY
INTERNATIONAL PROGRAMS & TECHNOLOGY
ASSISTANT
DEPUTY UNDER SECRETARY
MILITARY ASSISTANT
DIRECTOR
NATO AFFAIRS
DIRECTOR
FAR & MID-EAST AND
SO. HEMISPHERE
DIRECTOR
MILITARY TECHNOLOGY
SHARING
DIRECTOR
TECHNOLOGY TRADE

ORGANIZATION OF
DEPUTY UNDER SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING
(INTERNATIONAL PROGRAMS AND TECHNOLOGY) **

Deputy Under Secretary	Dr. Vitalij Garber
Assistant Deputy Under Secretary	Rear Admiral Samuel W. Hubbard, Jr., USN
Military Assistant	Colonel John V. Ellis, USAF
Administrative Assistant	Mrs. Rita J. Artwohl

Assistant for Planning and Requirements — Dr. Jeanne S. Mintz

Director for NATO/European Affairs	Mr. Everett Greinke	Director for Near and Mid East and S. Hemisphere Affairs	Mr. Gerald D. Sullivan
Assistant Director for Projects	Mr. Albert M. Ligonke	Assistant Director for Projects	Mr. Albert J. LeBlanc
Staff Assistant	Colonel John A. Hager, USAF	Staff Assistant	CAPT William B. Gauber, USAF
Staff Assistant	Dr. Sherman Gee		
Staff Assistant	Mr. Francis M. Cavasco, Sr.		
Staff Assistant	Major Thomas L. Leib, Jr., USAF		

FUNCTIONS

- Programs of Cooperation
- Cooperative Projects
- Memoranda of Understanding (MOU's)
- Data Exchange Agreements (DEA's)
- Dual Production
- Long Term Defense Program (LTDP)
- NATO Industrial Advisory Group (NIAG)

FUNCTIONS

- Egyptian Initiatives
- Israeli Initiatives
- Korean Initiatives
- Data Exchange Agreements (DEA's)
- Japan
- Australia/New Zealand

Director for Military Technology Sharing	Dr. Francis B. Kapper	Director for Technology Trade	Dr. Glen Lunacky
Assistant Director for Munitions Control	LtCol Bruce B. Meiner, USAF	Assistant Director for Policy Analysis	Mr. Eugene M. Murphy
Staff Assistant	Mr. Howard H. Gardiner	Assistant Director for Strategic Technology	CAPT James J. Hower, USN
		Critical Technologies Project Dir.	Mr. Albert M. Bottoms
		Staff Assistant	Mr. Nicholis Montemarsili

FUNCTIONS

- Munitions Cases
- National Disclosure Policy Committee (NDPC)
- Symposia with Allies
- Visits from Allies
- Allied Exchanges and Training
- Foreign Ownership
- Foreign Military Sales Cases

- Critical Technology(s)
- U.S. Export Cases
- Technology Base (Data Base)
- Coordinating Committee Cases (COCOM)
- Economic Impact and Trends

** Does not include secretarial support

Attachment 4

ATTACHMENT 5

CRITICAL TECHNOLOGY EXPERT GROUPS

1. Array Processors.
2. Acoustic Arrays.
3. Computer Networks.
4. Structures, Materials, and Processes (originally, only diffusion bonding).
5. High Energy Lasers.
6. Large Scale Integration (LSI) Production.
7. Infrared Detection.
8. Jet Engines.
9. Widebody Aircraft.

ATTACHMENT 6

TECHNICAL TASK GROUPS (TTGS)

TTG A—Metal Working Machinery.
TTG B—Chemicals.
TTG C—Metals.
TTG D—Transportation Equipment.
TTG E—Telecommunications Equipment.
TTG F—Avionics and Navigation Equipment.
TTG G—Semi-conductor Equipment and Materials.
TTG H—Electronic Instrumentation and Related Items.
TTG I—Electronic Components.
TTG J—Photographic Equipment.
TTG K—Computers.
TTG L—Military Equipment and Materials.
TTG M—Atomic Energy Equipment and Materials.

Dr. GARBER. On October 1 of last year I was charged with being the focal point for the Defense Department on technology transfer matters. Those duties involved the processing of dual-use cases with primary emphasis on exports to the Warsaw Pact nations and the People's Republic of China as well as munitions cases when the primary emphasis is on exports to the free world countries.

I believe that decision was made in part because I reside in the Office of the Under Secretary of Defense for Research and Engineering and it is our Office's primary responsibility to worry about the technological base of the United States as well as the free world, particularly the NATO countries.

Therefore, we felt that if we are to husband that base and to further areas of technology and industry that are most important to our defense, we should also probably be in the best position to try to identify those which could hurt us vis-a-vis our adversaries.

We, therefore, even before this current crisis, have initiated several approaches in the process of reviewing cases. The most important one, of course, was mandated by the Export Administration Act which required my office to come up by next October 1 with a list of critical technologies.

We can get into some of that later but basically those would be——

Senator BYRD. May I interrupt you on that point? You say to come up with by next October 1?

Dr. GARBER. We will have it by October 1, 1980.

Senator BYRD. That is a long way off.

Dr. GARBER. That is correct. Therefore, while we were developing and mounting that effort, we had to address which criteria, and on which basis we will deal with the hundreds and actually thousands of cases that need to be reviewed now and in the future.

Our approach was to take an emphasis somewhat different than we have in the past. Whereas in the past the primary emphasis was on the technological sophistication of the equipment, we are now attempting to start looking at not just the sophistication but primarily what is the state of the art in the Soviet Union in that area; and then, no matter the level of sophistication of the equipment or technology, if it would raise that level and if that had a military impact that would affect us adversely, we would recommend denial on that basis.

In such an endeavor I have talked to my colleagues at State and at Commerce and basically have their assurance of philosophical support for such an approach. The main differences usually are in the interpretation whereby we in Defense indeed tend to be conservative and tend to view what is important militarily quite seriously and therefore, in some cases, disagree.

Senator BYRD. How much difficulty have you had with the Commerce Department accepting your viewpoint on that?

Dr. GARBER. Since I came to office for this particular task, I have not found much difficulty along those lines primarily because in my opinion we have always persevered with the viewpoint we really felt was in our national security interests. That is not to say we do not have debates or, rather, my staff does not have debates.

As I mentioned earlier, it is fair and honest to say that as a rule Commerce tends to very often recommend a more liberal position. However, I have not felt that we were not able to get our position across in any case since I have taken office.

Senator BYRD. I can see why the Commerce Department would want to promote trade to the best of its ability. Personally, I favor trade. I think it vitally important that we have trade throughout the world.

My concern, however, is with the Soviet Union and its satellites, because I think if you do not take into consideration the Eastern bloc nations, the Warsaw Pact countries, I do not know how you can effectively hit at the Soviet Union. You deal with the Eastern bloc countries, as well as with Russia, do you not?

Dr. GARBER. Yes; we deal primarily with Warsaw Pact and also the PRC where commodity controls are concerned.

Senator BYRD. I am corect, am I not, that there are no exports going to Russia now which have been permitted under the validated licensing system?

Dr. GARBER. That is correct.

Senator BYRD. The Defense Department is satisfied that that is the case?

Dr. GARBER. That is the case to the best of my knowledge. It has been so stated to us that is the case, and we certainly accept that that is the case.

Senator BYRD. I received a letter the other day from a fellow citizen from my home town. I have known him a long time. He is a very fine and dedicated individual. He is concerned that American business seems more concerned with profits than as he expressed it "the overall defense of the United States." He bases that on the fact that there has been a transfer of high technology to the Soviet Union. That is correct, isn't it? There has been a transfer of a good bit of high technology to the Soviet Union?

Dr. GARBER. In my opinion. I believe that we can say that on balance there has been a transfer of technology to the Soviet Union that has helped them make significant strides forward.

Senator BYRD. So to put it another way, the United States or the President has found it desirable to denounce Russia and to put an embargo on grain from our country to Russia, and yet up until just this month, the United States has been permitting export of high technology items to the Soviet Union?

Dr. GARBER. I would say that high technology items were not permitted and we have tried in the past, speaking for the executive branch, to control them. In my opinion what has gone was on balance a lot of knowledge that resides not necessarily in just high technology items but knowledge that contributed to the industrial base and technological base of the Soviet Union.

So that while we had these criteria all along that were fairly restrictive for high technology items, on balance I believe we need to relook at what the absorption rate has been, what has contributed to their capability, and reassess our criteria.

Senator BYRD. It seems to me that it would be very foolish for us to permit the export of material that will be helpful to the Soviet war machine, when the President's budget for the upcoming year calls for the expenditure of $142 billion, primarily to prepare ourselves for potential or possible action by the Soviet Union.

Are you satisfied with the procedures being used in the Commerce Department?

Dr. GARBER. I think the procedures in the Commerce Department are adequate to reflect the policy that has been in force as previous witnesses have indicated. We now have an interagency review, involving State and other departments in addition to Commerce, which is trying to focus on how to implement the President's direction in the wake of the Afghanistan invasion.

And, therefore, I would expect new procedures to evolve. I do not believe that business as it was before the crisis is adequate. Furthermore, I do not believe that business will be as usual in the future.

Senator BYRD. Do you think the procedures which existed before this crisis are no longer adequate, in the light of what has transpired and ought to be revised.

Dr. GARBER. I am not quite sure, sir, that I would zero in on procedures as much as criteria as well as the areas that we actually control and the areas that we have the ability to look at. Some of the items under general licenses that were mentioned should be reviewed I think, to ascertain if they should be placed under validated license control.

If I may say so, I believe that the mechanical procedures of our interface with Commerce are quite adequate.

Senator BYRD. What steps have been taken to implement the announced policy of the administration to embargo high technology transfer to Russia?

Dr. GARBER. As witnesses have said, we have placed an embargo on all validated licenses. My office in conjunction with the interagency group is now discussing several options to bring in a more broad set of controls that we are considering. We are discussing at the same time how to make such potential controls effective by getting the support of our allies.

Senator BYRD. Correct me on this because I may be wrong, but the President specified high technology transfer. Is that correct?

Dr. GARBER. Yes, he specified that.

Senator BYRD. But on the operating level, do you interpret that rigidly, or do you interpret it to mean items which can be helpful to the Soviet war machine?

Dr. GARBER. The only way we can operate now is in a rigid way, Mr. Chairman. Right now we have no way of catching some of the items that may be helpful to the war machine because they do not come through the validated licenses. All the validated license requests that come through are not being approved at this time.

Senator BYRD. Are you saying then that the Defense Department does not necessarily have jurisdiction, does not necessarily have cognizance of what might be exported?

Dr. GARBER. That is correct at this time. There are many exports that potentially have use in the broad military-economic sense which are not controlled by us or other agencies. That is the subject of the deliberations of the——

Senator BYRD. Of other agencies? They must be controlled by some agency.

Dr. GARBER. Well, they are under general license. We do not review general licenses in the Defense Department and general licenses allow for trade.

Senator BYRD. So, unless the Commerce Department seeks your view on a particular item, you have no input on it in that regard?

Dr. GARBER. We have no input except in the formulating of the policy that is now underway. However, as far as the cases for a specific transaction, that is correct.

Senator BYRD. How many license applications have been submitted to the Department of Defense for review since the new policy was announced?

Dr. GARBER. If I may ask Captain Hower, who is in charge of the actual processing—Jim, do you know? We can supply that for the record, but can you give us an approximate number?

[The information follows:]

NUMBER OF LICENSE APPLICATIONS

Since the new policy was announced on January 11, 1980, the Department of Defense has received 128 license applications for review. Of this figure 12 applications were for the Soviet Union while the remaining 116 were for Eastern European countries and the People's Republic of China.

Captain HOWER. We probably received as many as maybe 100, 150 license requests. Now, this is all of the bloc and we are still reviewing those cases that might be submitted for the Soviet Union.

Senator BYRD. So, you have 100 to 150 requests?

Dr. GARBER. For the bloc.

Captain HOWER. This would include all. Approximately 150 license requests have come in.

Senator BYRD. Since the new policy was announced?

Captain HOWER. Yes.

Dr. GARBER. This is Captain Hower, U.S. Navy, who is in my organization. He is in charge of processing the actual license requests.

Senator BYRD. Of the 100 or so applications that have been made, have many been acted upon?

Captain HOWER. As far as processing, staffing and getting a technical evaluation, that is proceeding in the standard manner. I am also submitting the Defense position on those licenses wherein the staffing is complete.

As far as I know there are no licenses to be issued for the Soviet Union cases, although I believe licenses for equipment that are intended for other Warsaw Pact countries will be granted.

Senator BYRD. So, is the committee to understand that licenses for the Russian satellites, the Soviet bloc countries in Eastern Europe, were not affected by the President's order and your understanding is they probably will be granted?

Dr. GARBER. May I interject here? I believe Captain Hower is indicating that the procedure for review will go on but the final decision will not be based on a blanket denial to the other Warsaw Pact members. However, in our evaluation of the review, we will use our judgment as to whether there can be a military impact. We do assume that, if technology conferred were to be leaked, it will be leaked from the other Warsaw Pact members to the Soviet Union.

So, I would not expect any cases will be recommended for approval to the Warsaw Pact countries where the Defense Department would deem these to be of detriment to our national security. However, that would be in a narrow sense.

Senator BYRD. Do you feel that the Department of Commerce has complied with the recommendations of the Department of Defense with respect to the ZIL automotive facility?

Dr. GARBER. I do not know at this stage what final action has been taken on the ZIL case. I am not aware of what the Commerce Department's recommendations will be.

Senator BYRD. But your position, or the Defense Department's position, is negative, as I understand?

Dr. GARBER. We had a negative recommendation.

Senator BYRD. How does the current administration policy differ from the policy stated 2 years ago in Policy Review Memorandum 31 which called for the denial of strategic technology to Russia?

Dr. GARBER. Could you repeat that, sir, please?

Senator BYRD. How does the current administration policy differ from the policies stated 2 years ago in Policy Memorandum 31 which called for a denial of strategic technology to Russia?

Dr. GARBER. I think maybe in three ways. First, the crisis in Afghanistan certainly has placed the need for a total reevaluation of trade by our technological and industrial sector with the Soviet Union. That is still under review. Second, we have an embargo we mentioned on validated licenses.

The third item, namely, how we evaluate what is strategically important, that is, the methodology and the intent, has not changed. What has changed is our assessment, I believe, of the threat we are facing. Therefore, I believe that the evaluations will reflect that assessment on a case-by-case basis irrespective of whether the embargo will be lifted or not lifted.

Senator BYRD. Has a deadline been set in regard to ZIL facility to comply with the Department's——

Dr. GARBER. I am not aware of any such deadline.

Senator BYRD. In your judgment, is there much advantage—certainly there is some advantage, but is there much advantage from a military point of view in stopping transfer of equipment or material that can be used in a military way to Russia, if the same transfers are permitted to Eastern bloc countries, such as East Germany?

Dr. GARBER. I believe there still can be some advantage depending on the sector. For those items that are subject to compromise, I do not think there is any difference because we assume they will flow. However, building up certain sectors of the Soviet economy proper could be more detrimental to us potentially than building up a similar sector in Hungary, Poland, or Romania.

Senator BYRD. Let me put it this way. Do you favor the same restriction being applied to the Eastern bloc countries as is being applied to Russia?

Dr. GARBER. I personally believe that restrictions on Russia should be more severe.

Senator BYRD. What about restrictions on the Eastern bloc countries?

Dr. GARBER. I believe they should also be more severe than they are.

Senator BYRD. Do you think both should be more severe than they are under present policy?

Dr. GARBER. I wouldn't say policy. I would say present interpretation.

Senator BYRD. Present interpretation?

Dr. GARBER. Yes.

Senator BYRD. And I assume that your enthusiasm for Interpretation 19 is somewhat limited?

Dr. GARBER. It certainly is. I have not even read it but I am puzzled to see how logistics, military support is less important to an operation than the same truck on the front line.

Senator BYRD. Thank you very much, Dr. Garber.

Mrs. Ellen L. Frost, Deputy Assistant Secretary, International Economic Affairs, Department of Defense, is our next witness.

STATEMENT OF ELLEN L. FROST, DEPUTY ASSISTANT SECRETARY OF DEFENSE, INTERNATIONAL ECONOMIC AFFAIRS

Ms. FROST. Thank you, Mr. Chairman. I am very glad to have this opportunity to respond to your questions on the role of the Defense Department in carrying out the President's recent decisions. I plan to summarize my statement. With your permission, I would like the complete text of my statement printed in the record.

Senator BYRD. Yes.

[The prepared statement of Ellen L. Frost follows:]

PREPARED STATEMENT OF ELLEN L. FROST, DEPUTY ASSISTANT SECRETARY OF DEFENSE

Mr. Chairman and members of the Subcommittee, I appreciate the opportunity to respond to your questions on the role of the Defense Department in carrying out the President's recent decisions to restrict certain exports to the Soviet Union. I would like to begin by describing the events that led up to those decisions as well as their aftermath.

Massive Soviet military forces have invaded the small, nonaligned, sovereign nation of Afghanistan. Almost 80,000 Soviet troops are there already. More are arriving daily.

This invasion is an act of naked aggression which violates all norms of international conduct. History teaches that when such actions are left unchecked they often inspire further aggression. Of immediate concern is the pressure now placed on Pakistan, Iran, and the Persian Gulf countries. As such the invasion endangers the United States and its friends and allies. It demonstrates clearly that the Soviet Union is prepared to use combat forces outside its generally recognized sphere of influence.

There has been overwhelming opposition to the Soviet invasion in the United Nations and throughout the world. Our allies and most of the nations of the Third World have called for Soviet withdrawal. But words alone would not suffice. Only actions can convey to the Soviets our resolve to resist aggression.

In early January the President announced a series of actions in response to the Soviet invasion. We have asked the Senate to defer consideration of SALT II. We have sharply curtailed U.S. grain exports. Except for the balance of the 8 million tons of wheat and corn committed under the terms of the US-Soviet grains agreement of 1975, exports of agricultural commodities and products needed by the Soviets for feed are prohibited. Included among these are wheat, feed grains and seeds, soybeans, and animal feeds which could be used directly to build up Soviet livestock herds. Also under continuing prohibition are shipments of meat, poultry, dairy products, and some animal fats which could be used to replace the animal production which the Soviets would lose. In addition, Soviet fishing privileges have been drastically reduced. Aeroflot landings in the U.S. have been cut back. New consular facilities and most cultural and scientific exchanges have been delayed or frozen. Shipments of goods under validated export licenses have been suspended, along with new licensing pending a review of our policy. Additional measures may be announced.

Soviet leaders did not expect these decisions. They expected us to behave as if profits were our only motive. They know now that we are willing to pay a price ourselves to resist aggression.

In selecting our response to the invasion, we looked for areas of particular Soviet vulnerability. Grain, and its substitutes, stood out as an obvious choice. The Soviets have suffered a recent major shortfall in grain production which no nation other than the United States can come close to filling. Grain shortfalls have been an Achilles' heel for the Soviets. The USSR is dependent upon grain imports for growth in its standard of living. After an initial reduction in livestock herds, an embargo will mean reduced per capita meat consumption in a country that normally does not provide adequate supplies. If we and other countries find it necessary to continue to restrict Soviet agricultural imports, the USSR will have to revise its hopes for improving basic living standards. The Soviet people have been promised an improvement in these standards. In many respects—housing, personal transport, and particularly the quality and variety of foodstuffs, the Soviet leadership has failed badly. Seen in this light, the President's decision is particularly well-targeted.

Another Achilles' heel for the Soviets is the manufacture of high-technology equipment. In this area we are considering more restrictive guidelines limiting high-technology exports. The review of export controls by an interagency working group chaired by the Department of Commerce is nearing completion, and specific proposals are expected to be sent to the President very soon. It is still too soon to say what those guidelines will be, or exactly how other nations will respond to our proposals. But for the most part we and our allies agree that the present situation warrants a more stringent application of controls.

As part of our review, we are taking a look at the entire range of benefits that the Soviets obtain from Western technology and equipment. We will continue to look at individual items, such as computers, and their particular applications. But in addition we will pay attention to the contributions that these exports may make to the establishment and maintenance of a high state of military readiness in the Soviet Union.

We are also devoting more attention to the Soviet learning curve in the area of advanced technology. It is extremely difficult to pin down the general benefits to Soviet technological innovation of infusions of Western goods and technology. While the Soviets' ability to copy or reverse engineer a product *in toto* is probably limited, they can often detect, if not identify, key technological breakthroughs embodied in Western and Japanese goods. This can open up "short cuts" in the solu-

tion of a military R&D problem. In the area of know-how and manufacturing technology, imports from the West may supply crucial learning experiences which permit an overall advance in Soivet capabilities. We don't know how to measure this "ripple effect," but it is safe to assume that it is there and that the Soviets place great value on it.

Throughout this period we have sought—and received multilateral support. On January 12, representatives of the major grain exporting countries met in Washington. This group generally agreed that its governments would not replace directly or indirectly the grains denied by US measures. They also agreed to set up a group to monitor grain flows on a continuing basis to achieve "our common purposes."

A few days later, Deputy Secretary of State Warren Christopher and Under Secretary of State Richard Cooper held intensive exploratory consultations with our European allies—including discussion in NATO, with high officials of the European Economic Community, and additional talks in Bonn, London, Rome, and Paris. I attended most of those talks. Under Secretary of State Philip Habib conducted similar consultations in Tokyo.

Our allies share our view that the Soviet invasion is a sharp and threatening deviation from Soviet policy in recent years. They agree that we must demonstrate to the Soviets that their conduct will involve heavy costs for the USSR. Their capabilities for responding to the Soviet threat differ, but we are encouraged by their desire to maintain a strong, united front under the current circumstances. Indeed, it has always been our experience that consistent and well thought out export controls, and their supporting rationale, are respected by our allies.

The Department of Defense has been participating fully in the decision-making process. We meet with other agencies almost daily. The full range of our policy concerns have been brought into play. The review of high-technology exports has called forth special efforts. Dr. Garber's statement describes Defense Department perspectives on this subject more thoroughly.

Thank you, Mr. Chairman. I hope this overview has been useful. I am prepared to answer any questions you may have.

Ms. FROST. I will also take the occasion to make some comments based on the testimony and the questions and answers that I have heard this morning.

Senator BYRD. Fine.

Ms. FROST. As you know, Mr. Chairman, the recent chain of events began when massive Soviet military forces invaded Afghanistan. There has been overwhelming opposition to that invasion throughout the world. But clearly words alone do not suffice. Only actions can convey to the Soviets our resolve to resist aggression.

In early January the President announced a series of actions in response to the Soviet invasion. While the full details are in my statement, it might be useful for me to summarize the agricultural portion.

Except for the balance of the 8 million tons of wheat and corn committed under the terms of the United States-Soviet grain agreement of 1975, exports of agricultural commodities and products needed by the Soviets for feed are prohibited. Included among these are wheat, feed grains and seeds, soybeans, and animal feeds which could be used directly to build up Soviet livestock herds.

Senator BYRD. Could I interrupt a moment? There will be the transfer of 8 million tons of wheat and corn to the Soviets this year, is that correct?

Ms. FROST. That is correct. As you know, the 1975 grains agreement, which was a government-to-government agreement, provided that the Soviets must buy at least 6 million tons. They were, moreover, free to purchase an additional 2 million tons without asking permission. And that totals 8 million tons of grain, to which we have committed ourselves for sale under the terms of that agreement.

97-307 O - 80 - 13

Senator BYRD. So, despite the Russian aggression in Afghanistan, Russia will continue to buy that many tons of grain from the United States?

Ms. FROST. That is correct.

I should point out a good deal of that grain was already shipped. I would also like to point out that the total for the Soviet Union was expected to be 25 million tons. Therefore, the balance that will not be shipped to the Soviet Union is 17 million tons. It was the President's decision that the United States should live up to its written commitment.

Senator BYRD. But in doing that, it means that Russia will get one-third of what she sought?

Ms. FROST. That is correct.

The shortfall, however, was even greater than the amount committed by the United States. The full details of the grain shortfall and what is expected to be provided or not provided are available in Dale Hathaway's testimony before Senator Stevenson on January 22. I would recommend perhaps that the staff go through the transcript for the information that you are seeking.

There was also a question about what the other countries have done. The European Community has suspended restitution payments on grain exports to the Soviet Union. And if you are at all familiar with the grain exports of the Community, that is in fact a cessation of shipments to the Soviet Union. It is not called an embargo but it has the same effect.

Under continuing prohibition are shipments of meat, poultry, dairy products, and some animal fats which could be used to replace the animal products which the Soviets would lose. In addition, Soviet fishing privileges have been drastically reduced. Aeroflot landings in the United States have been cut back. New consular facilities and most cultural and scientific exchanges have been delayed or frozen.

Of most direct relevance to this hearing, shipments of goods under validated export licenses have been suspended, along with new licensing pending a review of our policy.

The Soviet leaders did not expect these decisions. They clearly expected us to behave as if profits were our only motive.

In selecting our response to the invasion, we looked for areas of particular Soviet vulnerability. Grain and its substitutes were an obvious choice.

Another Achilles' heel for the Soviets is the manufacture of high technology equipment. In this area we are considering more restrictive guidelines limiting high technology exports.

At this point, Mr. Chairman, I might clarify the discussion you had earlier with Mr. Knowles on what constitutes more restrictive measures. In your exchange with Mr. Knowles, Mr. Chairman, you repeatedly raised the question of additional restrictions. Mr. Knowles clarified that and I want to reiterate that clarification. The President's decision on more restrictive guidelines pertains to the pre-Afghanistan situation. Pending this review everything is frozen.

So, if as the result of the review certain items are released from this interim freeze, it does not mean that the President's decision has been overturned. To repeat: The President's decision to impose more restric-

tive guidelines refers to the status quo prevailing at the time of the Afghanistan invasion and not to this interim freeze.

Senator BYRD. It appears to me then that you are indicating that after this review is completed, that there will be less restrictions on the Soviet Union than there are now.

Ms. FROST. At the present time we are under an interim freeze on all shipments requiring validated license. The decision to impose more stringent export control standards takes as its starting point the status quo at the time of the Soviet invasion. The current embargo of these shipments is part of an interim measure pending review.

So your reference point, if you will forgive me for suggesting it, should not be this interim review period but rather the state of affairs prevailing at the time the President made his decision.

Senator BYRD. From my point of view, I think the reference point should be the situation as exists today. I do not want to see it relaxed. I think that indicates we are going up the hill and coming down again.

Ms. FROST. Well, I will comment some more on that issue at the end of my remarks.

It is too soon to say exactly what the new guidelines will be, but clearly there will be a more stringent application of controls.

We are taking a look at the entire range of benefits the Soviets have obtained from Western technology and equipment. We will continue to look at items such as computers and their applications, but in addition we will pay attention to the contribution these items make to the establishment and maintenance of a high state of military readiness in the Soviet Union.

We are also paying more attention to the Soviet learning curve in advanced technology. My longer statement provides more detail on that point.

Throughout this period we have sought and received multilateral support. On January 12, representatives of the major grain exporting countries met in Washington. And a few days later Deputy Secretary of State Warren Christopher and Under Secretary of State Richard Cooper held intensive exploratory consultations with our European allies, including discussions in NATO, with high officials in the European Economic Community, and additional talks in Bonn, London, Rome and Paris.

I personally attended most of those talks. Under Secretary of State Philip Habib conducted similar consultations in Tokyo.

Our allies share our view that the Soviet invasion is a sharp and threatening deviation from Soviet policy in recent years. They agree that we must demonstrate to the Soviets that their conduct will involve heavy costs for the U.S.S.R. Their capabilities for responding to the Soviet threat differ, but we are encouraged by their desire to maintain a strong, united front under the current circumstances. It has always been our experience that consistent and well-thought-out export controls and their supporting rationale are respected by our allies.

Throughout this period the Department of Defense has been participating fully in the decisionmaking process. We meet with other agencies almost daily. And the full range of our policy concerns have been brought into play.

I might at this point make some additional comments based on the questions and answers that I have heard so far.

First of all, it is important to keep in mind a distinction between illegal or clandestine acquisition of items from countries that are not in COCOM and items that are under COCOM control. It is probably not within the power of the United States or any country to prevent any and all illegal and clandestine acquisitions on the part of the Soviet Union. These do occur. At least one is cited in Dr. Verona's testimony.

My point is simply that illegal acquisitions are not themselves an indictment of what our criteria are under these export controls. That is to say, we assume that the Soviets will in fact acquire things illegally. The purpose of the control is to make sure that the controlled items are not obtained in quality and in quantity and that our lead-time is preserved.

As far as Eastern Europe goes, I would like to make an important point. This is an extremely complicated foreign policy issue. And I encourage you in the course of your deliberations to receive testimony from the State Department probably in closed session.

I would like to say openly, however, that the question is one of striking the right balance. On the one hand, it is very clear that the more hard line Warsaw Pact nations can indeed be conduits to the Soviet Union. To the extent that a control is imposed for national security purposes the question arises of how to treat these countries. And it is a very real one.

At the same time the United States has encouraged more independent behavior on the part of the relatively more moderate Warsaw Pact countries. Indeed, Congress itself has granted most-favored-nation status to Poland, Hungary, and Romania. I make this point only to say that the individual nations of Eastern Europe differ. They differ dramatically with respect to their political behavior and with respect to their relationship to the Soviet Union.

Therefore, it is correct to say that the question of how to treat Eastern Europe is under review at the present time. I merely want to introduce these distinctions into the record so that I can make the point that this is indeed a very complicated and sensitive issue.

As far as foreign availability is concerned, I must observe this was a topic that was missing altogether in the discussion with Mr. Brady. It is very convenient to assume that the United States has a monopoly on technology. For the most part this is not so, with some important exceptions.

I observe that the Export Administration Act of 1979 places emphasis on foreign availability but makes at the same time the important caveat of national security. This is an example of what I think is a larger point worth making at this hearing, that the problem of export controls has been and will be where to draw the line. This is an issue on which reasonable people disagree.

I cite the law because I believe that it is fair to say that neither in the Congress nor in the country as a whole is there unanimity of view as to just where to draw this line. I think I will stop there, Mr. Chairman, and answer any questions that you might have.

Senator BYRD. Thank you, Ms. Frost.

I want to yield to Senator Jackson who is a leader in the Senate on the matter of the United States and the Soviet Union's military, and

the relative position of the two countries. Before yielding, I just want to make one comment and then I will get back to your statement.

In January the President announced a series of actions in response to the Soviet invasion: "We have asked the Senate to defer consideration of SALT II."

The President and other officials of Government have said that SALT II, that the ratification of SALT II, would be in the best interests of the United States. If it is in the best interests of the United States, why do we want to defer consideration of that treaty now by a directive saying we want to condemn Russia by deferring SALT II? If it is in the best interests of the United States, why do we want to defer action? Some of us do not think SALT II is in the best interests of the United States.

Senator JACKSON. Well said, Mr. Chairman.

I want to commend you for your leadership in holding these hearings on Soviet defense expenditures, and I wish to express to you my support for this special inquiry into the adverse military implications of U.S. export policies.

I especially wish to commend Mr. Brady, as well as witnesses who appeared previously, such as Dr. Verona of the Defense Intelligence Agency, for their candid and alarming assessments of the weaknesses of our export controls and the constant erosion of our technological lead over the Soviet bloc.

As you know, Mr. Chairman, the Permanent Subcommittee on Investigations, which I previously chaired and which I am now serving as vice chairman, has had a longstanding interest in the adequacy of export controls as they relate to our national security.

In a forthcoming hearing, the Investigations Subcommittee will be examining the need for legislative and administrative improvements in the regulation of security-sensitive exports.

Mr. Chairman, I believe the record of these hearings that you have developed will present a most useful set of documents in the consideration of this issue by the Investigation Subcommittee and the recommendations that you may make here will be extremely helpful.

Might I just add this one thing: There seems to be a view that in dealing currently with the Soviet problem, that there is something radically new about it. I am concerned that we are going to go through a process of quick fixes, of gimmicks, to give the appearance that we are doing something for the short term.

Obviously, our problems with the Soviet Union are not new. The problem of Afghanistan is not new. I wrote an article in 1956 predicting the invasion of Afghanistan one day, and if anyone really believes that the Soviets will stay within their borders, I think they must be living in a dream world.

My concern, Mr. Chairman, is that many people who have been totally wrong over the years are now overreacting and may do things that can be indeed dangerous. I am trying to caution a lot of my dovish friends who are now so zealous in their efforts to straighten out the record that they may do some things that are rather reckless. If coming from me that is a shock, it shouldn't be; it is just commonsense.

And I think what we need—I will say to the Deputy Assistant Secretary here—is a long-term, consistent, steady policy. The Soviets

are not deterred by gimmicks or quick fixes. What they really need to know is that the United States finally learned that this is indeed a protracted struggle; they need to know that this country does have the will to stay the course. That is the issue, and the signal must be clear to them. Any other signals are not going to mean anything.

I hope we have learned this lesson now, and that we will get on with the business of taking those steps that will provide for our security and that of our allies, with their help and cooperation, recognizing that technology transfer is but one part. There is no rascal-proof technological nontransfer system that can be worked out, but certainly we knew—or should have known—that the Russians were going to use the Kama River computer that we gave them as they did use it. The Kama River case is a classic example of where we knew—or should have known—what we were doing. The danger lies in indulging in the assumption, as many have done over the past years, that the Soviets somehow had changed in their intentions.

I would like for some of my friends who have been confused in the past to spend a few weeks in the People's Republic of China and talk with some of their leaders who have negotiated with us and with the Soviets, and maybe they will come back the wiser for it.

Senator BYRD. Thank you, Senator Jackson.

Ms. Frost, I have been impressed with your ability, not necessarily with your reasoning, but obviously you are a very able individual. In reading your statement, on page 2 you say that "in early January the President announced a series of actions in response to the Soviet invasion. The first was to ask the Senate to defer consideration of SALT II."

Now, if SALT is in our best interests, I don't know if deferral will particularly hurt the Russians. I happen to think SALT is not in our best interests.

No. 2, you say we have "sharply curtailed U.S. grain exports." Well, we have curtailed two-thirds, but they will continue to get one-third. You say, "In addition, Soviet fishing privileges have been drastically reduced." Why were they not eliminated? Why were they only reduced?

Ms. FROST. Mr. Chairman, I am not knowledgeable on fishing matters and did not take part in that decision.

[The information follows:]

Question. "Why were Soviet fishing privileges only reduced and not eliminated?"

Answer. Soviet fishing quotas in U.S. waters have been reduced from the announced 1980 level of 420,000 tons to just 75,000 tons. The decision to permit this small quota reflected a judgment that some Soviet fishing vessels were already operating in U.S. waters and that to force them to leave would be an inappropriate course of action.

There is a general point I might make at this time, however. If you shoot all of the weapons you have got, you haven't got anything left. This may be a policy consideration, that is, if you embargo everything there is nothing left.

Senator BYRD. Well——

Senator JACKSON. What are the weapons you are going to leave?

Ms. FROST. I am not an expert in the graduated deterrence theory, but my point is simply this: If you cut off all exports of everything now, you don't have anything left.

Senator JACKSON. What do you mean by "you have nothing left"?

Ms. FROST. In the way of trade——

Senator JACKSON. Do you want to start a nuclear war, then? Some of these people are now talking war; that comes from the doves. They are talking war. I read about it the other day. Is that part of the deterrence?

Ms. FROST. My comments were limited entirely to the trade sanctions, which were the subject of the question.

Senator BYRD. You say Aeroflot landings in the United States have been cut back. There are still Aeroflot——

Ms. FROST. My memory—and I may be wrong—tells me that there were three landings a week permitted, and now there are two. I will check into that.

Senator BYRD. And that is supposed to be a great blow to the Soviet Union, and the Soviet leadership?

Ms. FROST. It was never anticipated that each and every one of these measures would have the same economic impact. Grain stands out overwhelmingly as the major example.

Senator BYRD. Yes; you point that out on page 3 where you say that "the purpose is to lower the basic living standards of the Russian people." I am a little more interested in hitting the Russian military and industrial buildup than I am in lowering the living standards of the people themselves, who have no control over their Government. But I support the President on what he did in regard to grain.

Now, you say another Achilles' heel for the Soviets is the manufacture of high technology equipment. You say, "In this area we are considering more restrictive guidelines limiting high technology exports." I thought we had already done that; but you say we are considering it?

Ms. FROST. To repeat my earlier point, Mr. Chairman, the subject of defining precisely enough for licensing purposes high technology export controls is very difficult to do; therefore, there was an immediate need to suspend the shipments pending a review of this very complex and technical matter and pending consultation with our allies.

The President's decision was not intended to be an answer to the question of how much more stringent the controls should be. The President's decision was intended to provide a halt pending that review.

Senator BYRD. Well, you don't reassure me very much when you say, "In this area of the exporting of high technology equipment we are considering more restrictive guidelines."

Ms. FROST. Perhaps you would——

Senator BYRD. If we are going to continue to permit exportation of parts and equipment and other items that can have even an indirect effect on the military potential of Russia, it seems to me we are just being very unwise. Sure, it can cut out some trade, but we have got to decide which is the most important.

Ms. FROST. Well, that is clearly correct, Mr. Chairman, and I can assure you that this point of view is clearly a part of the review.

I have found often that how a question is posed determines the answer. If you pose the question as helping the Soviets build up their

military machine, there isn't a person in this room who wouldn't agree with you. If you pose the question that a firm in someone's constituency has been denied a sale of shovels to the Soviet Union and that a French company or a German company has captured the sale, that becomes an issue of fair treatment of U.S. companies. Having been on the receiving end of pressures from Congress in that direction, I can assure you those pressures are very real, too.

As I stated, the problem is where to draw the line. I think there is no doubt but that the line will be shifted, but I can't supply you with any more details at this time because we haven't decided them ourselves. And even when we decide them ourselves, we need to consult with our allies.

Senator BYRD. Consult with our allies as to whether we will permit the export of high technology equipment to Russia?

Ms. FROST. You are raising the question of effectiveness, and I am glad that you brought it up at this point.

As you know, and as Dr. Garber's statement points out, the United States is a member of the coordinating committee known as COCOM, which consists of NATO countries minus Iceland plus Japan. The countries control on the basis of unanimity the export of high technology to controlled countries—the Soviet Union, the Warsaw Pact and the People's Republic of China. For any new restrictions to be effective, it would be important for us to have them adopted by our allies as well, so that something denied by the United States was not simply supplied by the Germans, for example. I am using the Germans purely hypothetically here.

Nevertheless, there may indeed be cases where the United States enjoys a unique lead, where the size of the project is very large, where the know-how is unique, where we might want to deny a U.S. export notwithstanding. We are not at that point of making that decision because we have not yet gone back to our allies and proposed multilateral restrictions. They have indicated in principle their desire to see more stringent application of the controls, and they told us so when we were in Europe.

What this means exactly is still not clear. The next step will have to be to discuss with them the results of our findings. If their reaction is negative to some of our proposals, it will then be up to us to decide whether we want to go it alone. I think there is going to be a strong case for doing that in some areas, and in others perhaps less so.

We are simply not ready to address that yet. It does seem that the question here is how effective the embargo should be. That is to say, if the other countries supply it, do you still want to go ahead and deny the U.S. company the sale anyway? The answer may well be "yes."

Senator BYRD. Let me ask, if I may, which of those countries has followed our lead and embargoed the shipment of grain and other agricultural products to Russia?

Ms. FROST. Well, as you know, Mr. Chairman, the European Community exports grain to the Russians as a whole; that includes all nine members of the European Community.

As I stated, they did make the decision to suspend the subsidy payment on exports to the Soviet Union, which, if you understand the European Community, means no grain exports.

With respect to the high technology, they have all indicated their willingness to cooperate. They are cooperating in this interim period

and we have not asked them to do anything more than that for the time being.

Senator BYRD. Is the committee to understand that none of those members have exported either grain or high technology to the Soviet Union since the invasion of Afghanistan?

Ms. FROST. That is my understanding. I will check that for the record.

[The information follows:]

I will answer this question in two parts because of the very different circumstances affecting restrictions on grain and technology.

Restrictions on European Community (EC) subsidies for grain exports to the Soviet Union apply only to new sales since the invasion of Afghanistan. The U.S.S.R. had purchased 400 thousand tons of subsidized grain from the EC prior to January 1, 1980. About 200 thousand tons have been shipped and the remainder will also be shipped as scheduled. The EC has approximately 2 million tons of additional grain available for export. However, because of the suspension of grain subsidies, about $89 a ton, on grain sold to the Soviet Union, the EC countries do not expect the U.S.S.R. to enter this market. Current grain prices on the world market, for example, are averaging about $185 a ton; unsubsidized EC grain would cost the U.S.S.R. an additional $89 over this price.

Looking at world availability of non-U.S. grain over the next six months shows that:

a. Canada has about 500 thousand tons of barley and no wheat available for export. However, Ottawa has stated that no additional grain will be sold to the Soviets.

b. Australia could handle export of 200 thousand tons of barley. As with Canada, Canberra has indicated it will sell no additional grain to the U.S.S.R.

c. The EC countries do not expect the Soviet Union to purchase their approximately 2 million tons of available grain because of the suspension of subsidies.

d. Argentina could make up to 500 thousand tons of corn available for export. Both Argentina and Brazil together could replace U.S. soybean exports to the U.S.S.R. [Deleted.]

To put the impact of U.S. grain restrictions in perspective, the U.S.S.R. was counting on importing 39 million tons of grain and soybeans in the marketing year July 1979-June 1980. This was to help offset a grain shortfall of roughly 60 million tons to the estimated 179 million-ton 1979 grain crop. This shortfall was targeted for sustaining the momentum of the very important Soviet livestock program and for maintaining already low grain stocks. Denial of the additional 17 million tons of U.S. grain beyond the 8 million tons of the U.S.-U.S.S.R. grain agreement will reduce Soviet imports to about 25 million tons. Given the one million tons the Soviets might purchase at premium prices from myriad sources, this still leaves Moscow roughly 15 million tons short on the import side as well as having to absorb the remaining shortfall of 20 million tons. [Deleted.]

Restrictions on EC exports of high technology to the Soviet Union since the Afghanistan invasion apply only to items which exceed the COCOM Lists for controlling dual-use technology to Warsaw Pact countries and China. ("Dual-use" refers to products and technology sold for civilian application but which could have potential military use.) Such items require review and unanimous approval by COCOM before they can be exported as an exception to the general embargo on high technology. [Deleted.]

Mr. FROST. There are, of course, other grain exporters. As you know from the newspapers, there are some discussions with Argentina. I would leave it to the State Department to answer the questions on the United States-Argentina negotiations, because I haven't been part of those.

Senator BYRD. I may be wrong, but as I understand the situation our allies said they would not increase their grain shipments to the Soviet Union. I was not aware that they had eliminated any shipments.

If you could establish that fact, I think that would be very interesting and helpful.

Ms. FROST. I will check that.

The main point to keep in mind now is that the amounts involved from the European Community are very small in comparison with

ours. There is no country which can by itself make up the short-fall caused by the embargo on——

Senator BYRD. That is two different things. One is the short fall and the other is whether they are continuing their trade, and your earlier testimony indicated they were not continuing their trade?

Ms. FROST. My understanding is that EC grain shipments have effectively been stopped for the Soviet Union, but I will check that.

Senator BYRD. Thank you.

On page 5 of your prepared statement you state:

> Our allies share our view that the Soviet invasion is a sharp and threatening deviation from Soviet policy in recent years. They agree we must demonstrate to the Soviets that their conduct will involve heavy cost to the Soviet Union.

That is a point I am not clear on. Just where does that heavy cost to the Soviets come from?

One item you mentioned was SALT, and perhaps that is a heavy cost, although the administration says that SALT is to our benefit. So if SALT is to our benefit, I don't know how that could be a heavy cost to the Soviet Union. The grain is the one item that presents some costs.

Fishing rights have been reduced; that is not something of great magnitude, I don't suppose. Cutting back the Aeroflot is not an item of great magnitude. So I am just wondering where it is. I favor it. I favor demonstrating to the Soviets that their conduct will involve heavy cost to the U.S.S.R., but I don't know where the heavy costs have been up to this point.

Ms. FROST. There are two topics not mentioned in my statement. One concerns the Olympics. In our discussions with Europe, it was clearly recognized that any action to boycott the Olympics would impose a heavy cost on the Soviet Union, not only in terms of economics but also in terms of the symbolic nature.

Senator BYRD. I agree. I think that you are quite right.

Ms. FROST. The other is the discussions we have held on the matter of credit. You know that we extend no credit to the Soviet Union and other countries do; and this would be another area——

Senator BYRD. Let's see if I understand this. You mean through the Export-Import Bank?

Ms. FROST. That is correct.

Senator BYRD. We haven't extended credits to the Soviet Union in recent years, have we?

Ms. FROST. No; we have not. You picked up the sentence about heavy costs for the U.S.S.R. from the paragraph dealing with our allies' perception. This would not be an area where we could impose any cost for the Soviet Union because we have no official credits and guarantees for the Soviet Union.

Senator BYRD. You see, that was done by an act of legislation. There are two reasons that the Soviet Union cannot get credits from the Export-Import Bank. One, the Jackson-Vanik amendment dealing with the immigration of Jews from the Soviet Union. And the second is my own amendment, which I put on two bills, the trade bill and on the defense authorization bill, which prevents the Soviet Union from getting more than $300 million in Ex-Im credit. So that is done by legislation; that was 5 or 6 years ago.

So, insofar as we are concerned, we haven't cut off credit as the result of Afghanistan; that was done a long time ago.

Ms. FROST. That is correct.

Senator BYRD. Now, if you could supply for the record just what countries and in what amounts have denied credits to Russia——

Ms. FROST. I will have to get that information from the State Department. They are the ones who have conducted the follow-on discussions on this topic.

[The information follows:]

Question. "Now, if you could supply for the record just what countries and in what amounts have denied credits to Russia . . . ?"

Answer. [Deleted.]

Senator BYRD. Thank you. That would be helpful, if you would do that.

Would you give us a little background as to how your office works with the Commerce Department in regard to the export trade?

Ms. FROST. Prior to October 1, my office was the point of contact for the Commerce Department and the State Department and the other involved agencies in the processing of export license applications. Roughly 75,000 to 80,000 cases a year come into the Commerce Department for licensing under all kinds of controls. Of those, perhaps 6,000 or so are East-West cases involving a national security judgment, and of those, perhaps 3,000 or roughly half came to the Defense Department as of the time that I had these cases. We relied then, as we rely now, on the Office of the Under Secretary of Defense for Research and Engineering on all questions concerning technology, including technology policy and the definition of "critical technologies."

The change announced by Mr. Duncan in August and effective October 1 centralized within the Office of the Under Secretary of Defense for Research and Engineering the technology export functions. It also moved from my office in ISA to Dr. Garber's office responsibility for the handling of all of the cases; and Dr. Garber's office is now the main point of contact with the other agencies on these cases. ISA, however, continues to be active in policy questions stemming from technology transfer.

My own staff includes an Office of International Economic Affairs and it includes an Office of Technology and Arms Transfer Policy. Both of these offices function in the larger context of international security affairs, broadly defined.

I think that answers the question.

Senator BYRD. Yes, it does. Thank you very much.

We are delighted that Senator Thurmond is here.

Senator THURMOND. I want to ask you this question: Some time ago some of us were at the White House and questions were propounded to the President about the situation. I raised the question of technology going to the Soviets. I reminded him that ball bearing plants and truck plants and computers—products of tremendous importance to the enemy—had been sold to the Soviets or their satellites. And I asked him the direct question:

Does the position you are taking here now mean that additional technology will not be sold to the Soviets or their satellites which could in any way aid them in their defense, keeping in mind that some items sold for civilian purposes end up for defense?

And his answer was an unequivocal "No," that it would not be sold.

Is that your policy? Is that your understanding? I mean, is that the policy of the Commerce Department?

Ms. FROST. I am with the Defense Department.

Senator THURMOND. How is that?

Ms. FROST. You asked if that is the policy of the Commerce Department.

Senator THURMOND. I mean, of the Defense Department, is that the policy of the Defense Department, and do you know whether it is also the policy of the Commerce Department from knowledge that you have gained from being in the Defense Department?

Ms. FROST. Senator Thurmond, there are normal differences of emphasis prevailing among the different agencies, but we do all work for the President, and we do all carry out his instructions. There is clearly a decision to tighten export controls vis-a-vis the Soviet Union.

It is clearly not the intent and never has been the intent to contribute to Soviet military production. You may recall in 1971 the Defense Department expressed strong reservations about the Kama River truck factory. Those reservations were conveyed to the President, and the President personally decided to go ahead, notwithstanding national security objections. We think on that case we have been quite consistent.

The ball bearing example was a more difficult one. I was not personally there when the decision was made, but my understanding was that for 2 or more years we had carried out the intent of the Export Administration Act of 1969, which was then the governing legislation, to restrict shipments despite foreign availability if we could not succeed in terminating that foreign availability.

Those machines, as I understand it, came from a country that was not a member of COCOM. We can discuss this further, if you like, but the point is that——

Senator THURMOND. Well, could I ask you this question?

I think we can be a little more direct. Is it the policy now of the administration, and do the Defense Department officials know that it is the policy of the administration, not to sell any technology to the Soviet Union or its satellites that would in any way aid their defense—as the President told me that was the case? Do you understand that that is his policy, or not?

Ms. FROST. That is his policy——

Senator THURMOND. Is the Defense Department supervising that policy for him, and seeing that it is carried out?

Ms. FROST. The President directed the Secretary of Commerce to undertake a review to define that policy and come up with recommendations. The Defense Department is extremely active in carrying forward the point of view that you have expressed within that group.

Senator THURMOND. As I understand, the Commerce Department refers these matters to the Defense Department for their recommendation or their approval; is that correct?

Ms. FROST. That is correct. I think when you used the term "referring," you are thinking about the cases. The cases are referred to the Defense Department and continue to be so. The review that I was speaking of is a little bit more direct than that. It isn't that proposals are sent over to the Defense Department for a review, like a case.

Quite the contrary, there have been high-level meetings on the subject which the Defense Department attends almost every day.

Senator THURMOND. Does the Defense Department have a right to express itself to the President and to the Commerce Department on matters which it considers would be of aid to the enemy?

Ms. FROST. Absolutely, and we do so regularly.

Senator THURMOND. And do you now understand the position the President took at the White House when he answered my question?

Ms. FROST. The only new element that surprises me is you used the phrase "and its allies."

Senator THURMOND. I didn't. I say the Soviet Union and its satellites; because if you sell to the satellites, it will end up with the Soviet Union.

Ms. FROST. Well, perhaps you missed my earlier comment on the question of East Europe. I might repeat it:

There is no question but that at least the hard-line countries of Eastern Europe are direct conduits to the Soviet Union, and from a national security viewpoint any restriction on the Soviet Union should logically be extended to them.

At the same time, it has been the policy of this administration to encourage where possible a growing independence on the part of the more moderate countries of Eastern Europe. Congress itself has granted most favored nation status to three of those countries—Hungary, Poland, and Romania.

I think with respect to most sensitive military items there is no question but that we should deny shipments to all of those countries. With respect to other items, I think we may have to look case by case. It would be premature of me to announce a decision on Eastern Europe when this is still being discussed in the review.

Senator THURMOND. I think you had better talk to somebody in the White House who heard the President's answer to my question, because it was specific that technology would not be conveyed to the Soviet Union or its satellites. You may think one satellite is going to get out from under the Soviet Union. You had better not count on that soon.

And, therefore, in my judgment, it is dangerous to sell or convey any technology to the Soviets or their satellites until the situation changes throughout the world.

Ms. FROST. Perhaps a distinction raised in a discussion that you weren't here for was the distinction between direct military applicability and a more general embargo.

Senator THURMOND. No; that is the very point I am making. I brought that out to the President. I said.

We sell computers for civilian purposes but they don't use it altogether for civilian purposes. They use it for military purposes as well as civilian purposes. The same thing with truck plants and ball bearing plants and other things that could be mentioned.

And I hope the Defense Department will understand this proposition.

That is the reason I wanted it to come from the President. I wanted him to answer it, the President of the United States. He did answer it. He answered emphatically that technology would not be conveyed any longer to the Soviet Union or its satellites.

And if Defense doesn't understand that, I think you better get in touch with the White House and get it clear.

Ms. FROST. I would be happy to do that.

Senator BYRD. Thank you, Senator. I think you are quite right. I was present when you asked the President that question. Senator Thurmond, before you came in I called attention to two sentences in the witness' statement that concerned me. I will read those two now: "Another Achilles heel for the Soviets is the manufacture of high technology equipment. In this area we are considering," it goes on to quote, "we are considering more restrictive guidelines limiting high technology exports." Well, No. 1, it seems to me we should be a lot more than "considering" and, we also should be going a lot farther than "limiting." I can't conceive that we would continue to ship high technology material to the Soviet Union. So I am concerned about the way this is phrased.

Maybe it doesn't mean what it says, but I am only reading it. "We are considering more restrictive guidelines limiting." I thought there was a complete embargo on it. And as I understand there is a complete embargo on it now as of today, is that correct?

Ms. FROST. That is right.

Senator BYRD. But you envision, or this statement envisions, that after the study is completed in about 2 to 3 weeks we have been told today, the embargo or the situation as it now exists today will no longer exist, and there will be a relaxing of today's existing requirements. Am I correct in that assertion?

Ms. FROST. There is no doubt but that the President had in mind a long term tightening and wide ranging restrictions. There is no doubt in anyone's mind that these are for the long haul. I want to correct any impression made that these are somehow short-term measures leading back to business as usual. This is not business as usual. The sentence you highlighted may have led you to think that there is a possibility that all will be the same as before. That is not so.

I perhaps should have written "In this area we have under review more restrictive guidelines."

"Considering" meant "debating" in that sense.

Senator BYRD. More restrictive can't be more strictive than today's total embargo?

Ms. FROST. I realize we have a disagreement here between you and the administration but the phrase "more restrictive" refers to the status quo at the time of the Afghanistan invasion.

Senator THURMOND. May I ask you who wrote that sentence? Did you prepare that or who did?

Ms. FROST. Well, oftentimes the whole building writes something. I probably wrote that myself. I am a member of the group chaired by Secretary Klutznick and I can assure you the word "consider" means——

Senator THURMOND. Well, are you familiar with the White House position on this? Senator Byrd was present when I propounded the questions to the President and I remember after it was over he said he was very glad I brought that out. And I thought I agreed with the distinguished chairman, Senator Byrd here, that the matter—how did you express that—that you would——

Ms. FROST. I am sorry?

Senator THURMOND. How did you express that in your sentence or Senator how did you say it was expressed——

Senator BYRD. "In this area we are considering more restrictive guidelines limiting high technology exports."

Senator THURMOND. Thank you.

Now, Mr. Chairman, "considering more guidelines restricting" that is not what the President said. That is not the policy of the President of the United States unless he misled us in the White House that night. He said there would be no more high technology. He said there would be no more technology to the Soviet Union or the satellites of the Soviet Union. That is exactly what he said.

And when you say you are considering restricting, that indicates that you have not even said you are going to restrict. It isn't a matter of restricting now. It is putting a complete embargo. I understand this to mean, Mr. Chairman, a complete embargo on technology to the Soviets. That is what the President conveyed that night. Was that your understanding——

Senator BYRD. Yes, sir.

Senator THURMOND. Well, then, how can you come down here Ms. Frost, and take this stance which indicates a weaker position? I think the President ought to know what you said here today. I think he needs to get a directive to you and to the other people who are going to implement this policy.

Ms. FROST. Unfortunately I don't have direct access to the President or perhaps I wouldn't be in this position.

Senator THURMOND. Well, then, why don't you convey to the Secretary of Defense what Senator Byrd and I told you reference the White House meeting and let the President decide it again if he has to decide it another time.

Ms. FROST. And the phrase was not "high technology for military applications" but simply all "high technology" defined in anyway, is that your understanding?

Senator THURMOND. The President said "There would be no more technology sent to the Soviet Union or its satellites that would aid in any way the defense of the Soviet Union or its satellites," whether it is high technology or other kinds of technology if it aids in their defense——

Ms. FROST. It is——

Senator THURMOND. And we reminded him that computers and other things that were sold for civilian purposes had been used to aid defense. And I said "Does that include them?" He says "It does."

In other words, it would include anything sent for civilian purposes that would aid the enemy in their defense.

Ms. FROST. As you heard me state, the Department of Defense opposed the original Kama River transaction and we would continue to oppose transactions of that kind.

Senator THURMOND. I understand. You mentioned that. But I am trying to understand if we can get away from these items from now on. And that is what the President assured us that night in the White House that he was going to do. So would you tell the Secretary of Defense what the President told us and ask him to talk to the President and see if that is firm. If he says that is not his policy would you write Senator Byrd and me and tell us what he said?

Ms. FROST. I think in any event I should straighten it out and I will do so.

Senator THURMOND. Well, if that is not his policy, would you let us know?

Ms. FROST. Yes, sir, that is what I am saying. I will let you know what happens next.

Senator THURMOND. Mr. Chairman, I have questions for some witnesses who are to testify. I wonder if you would mind placing them in the record?

Senator BYRD. Yes, sir, I certainly will.

[The questions of Senator Thurmond to be answered for the record appear on p. 212.]

Senator BYRD. I am sure the witnesses will be pleased to respond to Senator Thurmond's questions that he asked for the record.

I read this sentence before but if you would just answer it for the record.

"Our allies share our view that the Soviet invasion is a sharp and threatening deviation from Soviet policy in recent years." And then the sentence that I have in mind is this. "They agree that we must demonstrate to the Soviets that their conduct will involve heavy costs for the U.S.S.R."

Now would you indicate what heavy costs the Soviets have suffered up to this point?

Ms. FROST. Up to this point it would be hard to point to any heavy cost, since the costs under consideration or adopted for that matter are necessarily long term. Strictly speaking, there is no short-term cost on any of these measures, with the possible exception of the Olympics.

Senator THURMOND. Would you indicate the long-term costs that you forsee?

Ms. FROST. The long-term costs would lie in several areas. First, of course, is grain; and there I have already indicated that the United States is overwhelmingly the big player.

Second, we have approached the allies on the issue of official credits and guarantees.

Senator THURMOND. But you don't know what they have done in that regard?

Ms. FROST. That is right.

On the question of technology, if you sharply limited the export of computers alone and had the allies cooperate with that, I think that would be a heavy cost. There is no question but that the Soviets need computers and this is perhaps the area of greatest concern to the Defense Department.

I used the word "limit" and I realize you may challenge me on those grounds. I really wouldn't want to be more precise right now on what the allies would do, because we haven't gone back to them with any specific proposal.

Senator THURMOND. Does that complete your answer to the question?

Ms. FROST. Yes, to that question, I believe.

Senator BYRD. Thank you very much. I appreciate your being here today.

Ms. FROST. Thank you.

Senator BYRD. The next witness is Col. James Deerlove, military intelligence officer, Defense Intelligence Agency.

Senator BYRD. We welcome you, Colonel.

STATEMENT OF COL. JAMES DEERLOVE, MILITARY INTELLIGENCE OFFICER, DEFENSE INTELLIGENCE AGENCY

Colonel DEERLOVE. For the record, I work in the Science and Technology Directorate under Dr. Verona. I work for Dr. Verona. My responsibilities are in technology transfer. I have no prepared statement.

Senator BYRD. In your professional judgment as an intelligence officer in the Defense Intelligence Agency, would it be to the advantage of the DIA in estimating the state of Soviet technology if DIA were permitted full access to the validated export licensing and illegal diversion files of the Department of Commerce?

Colonel DEERLOVE. Sir, consistent with the laws that we have now, I don't really know what is in the commerce files. I have been told by other intelligence personnel that the information contained therein would provide a great deal more insight as to the Soviet technological capability because it would show some of the equipment that has gone in the past that we are unaware of.

Senator BYRD. Do you mean DIA is not aware of what equipment has gone in the past to the Soviet Union?

Colonel DEERLOVE. We have no direct channel into the Commerce Department, much as Dr. Garber mentioned. The general license that comes over from, or that goes to, Commerce, neither the Defense Department nor DIA is normally made aware of what is going.

Senator BYRD. What have you experienced in seeking information from Commerce with respect to technology transferred to Russia or mainland China?

Colonel DEERLOVE. Sir, I have had informal contact with members of the Intelligence Liaison Office in the Commerce Department. I have made no specific requests to them because at the time I knew that their answer, or I felt that the answer would be a denial of requests, so I did not ask them.

I have never formally asked the Commerce Department for information.

Senator BYRD. To what extent is DIA asked to comment on export license applications referred to DOD?

Colonel DEERLOVE. Of the licenses forwarded to DOD, those that are in high technology areas that have a possibility of diversion to military uses, we do receive a chance to comment on them. The quantity—in the past year we have commented on less than 50. Most of them have been in computers, in computer areas. I am sure that is by no means the total number that the Defense Department has received to provide an opinion on, but that is what has been forwarded to us.

Senator BYRD. Did DIA give affirmative or negative reactions to most of those cases, or to those cases?

Colonel DEERLOVE. Sir, to date and for specific facts I would have to provide them later, but I was asked in front of Representative Ichord's committee last spring the same question, and at that time we

57-007 O - 80 - 14

had, I believe, 28 cases in the year previous to the one in June of 1979, and we recommended denial on less than 10. Most of them had some sort of a stipulation where if there was computers there would be an overwatch or some type of protecting device supplied to keep the diversion from happening.

Senator BYRD. Of those less than 10 that you—that DIA recommended negatively, were any of those licenses granted, do you know?

Colonel DEERLOVE. I have no idea, sir. We do not get a followup on what happened.

Senator BYRD. Prior to your attendance at this hearing, were you aware that a high technology laser had been licensed for application to the ZIL automotive facility?

Colonel DEERLOVE. No, sir.

Senator BYRD. Would that matter be of interest to the DIA?

Colonel DEERLOVE. Yes.

Senator BYRD. To assist the Defense Intelligence Agency in assessing threat technology levels, does the Department of Commerce routinely provide information regarding high technology exports to potential adversaries?

Colonel DEERLOVE. Not to my knowledge, sir. I have not seen any routine or even special Commerce publications in any of the channels that I review.

Senator BYRD. From where you sit are the regulations governing problems between DIA and the Commerce Department in regard to export licenses satisfactory; or would it be helpful, over all, to have changes, and if so, what changes?

Colonel DEERLOVE. Sir, my understanding of the 1969 Export Administration Act gives the Secretary of Defense the power to recommend a veto on any sale of high technology items or equipment; and with that proviso the Defense Department, at least from my point of view, has a means of voicing its vote in the system.

Senator BYRD. Thank you very much, Colonel.

The committee will keep the record open until Friday, February 8, for possible additional questions for the record. There are several witnesses who agreed to furnish replies for the record. I don't want to request some time that is unreasonable. I will ask the staff to work with the witnesses and for something mutually agreeable.

[Questions submitted by Senator Harry F. Byrd, Jr., follow:]

QUESTIONS SUBMITTED BY SENATOR HARRY F. BYRD, JR., ANSWERS SUPPLIED BY KENT N. KNOWLES, DIRECTOR, OFFICE OF EXPORT ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE

Question. Is the Office of Export Administration currently approving any exports to the Soviet Union which involve validated licenses?

Answer. No licenses for strategic or high technology goods or technical data have been approved since the President directed on January 4, 1980, that such licensing be suspended. Some licenses have, however, been approved for agricultural commodities.

Question. Has there been any discussion in the Office of Export Administration of procedures for making exceptions to the President's announced policy of stopping high technology export (sic) of items shipped pursuant to validated licenses?

Answer. There has been discussion within the Administration, including the review group chaired by the Secretary of Commerce, of what, if any, exceptions to the embargo should be recommended. The discussions have not yet resulted in concrete action.

Question. At any time, have you or, to your knowledge, have any other officials at Commerce or the Office of Export Administration advised anyone that the President's new export policy would be of short duration?

Answer. No. The President has made it very clear that the controls would not be of short duration and we have made strenuous efforts so to inform all concerned personnel. In this context, of course, there have been and probably will continue to be adjustments to the scope of the new regulations.

Question. What is the present status of the draft memorandum circulated at Commerce which discusses exceptions to the President's policy?

Answer. The memorandum you mention was a preliminary paper laying out the issues and the spectrum of possible options. It is no longer relevant, having been superseded by later discussions.

Question. The Administration has indicated that, in addition to high technology export, trade would be "severely restricted" also in the area of "general commerce." Has the Office of Export Administration imposed any restrictions on exports to Russia under general license? If so, please explain the extent of those restrictions.

Answer. Certain items previously under general license have been made subject to validated license requirements. Regulations were published in January and February, 1980, putting agricultural commodities and products under validated license control. On February 4, 1980, marketable phosphate rock, phosphoric acid and phosphatic fertilizers of all concentrations were subjected to validated license control and on February 25, 1980, the Secretary of Commerce announced a long-term suspension of such exports. No further actions have been taken to date in this area. If any are to be taken in the future, they will not be taken until the review of licensing policy toward the USSR has been completed.

Question. Have requests for export to the ZIL automotive facility been disapproved since the President announced his new policy?

Answer. No, but processing was suspended effective January 4, 1980.

Question. What recommendation has the Department of Defense made for the applications for license of exports to the ZIL facility?

Answer. They have recommended denial.

Question. In your judgment, as Director of the Office of Export Administration, do you believe it is desirable for the Kama River Purchasing Office to be integrated with the Soviet Consulate in New York City, or do you feel that step would give diplomatic immunity to the Office and, therefore, be unwise?

Answer. This matter is not within my area of responsibility. The Department of State would be better able to provide a full response to this question.

Question. How many validated licenses have been issued in the past on an annual basis for export of commodities on the commodity control list to Russia?

Answer. Validated licenses valued at $208 million in 1979, $289 million in 1978, and $78 million in 1977, were issued by the Office of Export Administration for exports to the USSR.

Question. How do you determine which license applications to present to the Department of Defense for review?

Answer. As required by Section 10 (g)(2) of the Export Administration Act of 1979, Defense and Commerce have an understanding on the types of commodities and technical data to be referred to Defense. Basically, however, Defense may review any license application it wishes.

Question. What basis of expertise is present at the Office of Export Administration for determining which types of technology might have uses in advanced Soviet research and development for weapons systems?

Answer. OEA has qualified engineers in each licensing division that review and analyze export applications. OEA relies for much of its information in this area, however, on the intelligence community and Defense. In fact, all applications to export technical data to the USSR are referred to Defense.

Question. Do you consult with the Defense Intelligence Agency or the Central Intelligence Agency in determining whether licenses should be submitted to DOD for review?

Answer. The determination as to whether a license application should be submitted to Defense for review is made on the basis of our understanding with Defense as to what commodities and technical data they wish to see. When there is doubt, Defense is asked whether they wish to see the particular application. DIA and CIA advise Defense and Commerce both on individual license applica-

tions and on what types of commodities and technical data Defense should review.

Question. Who makes a final determination (on which licenses are to be referred to DoD)?

Answer. Commerce is responsible for making the final determination on an export application. If Commerce and Defense do not agree on the disposition of a case the Act provides a mechanism to refer the case to the President for a final decision. However, Commerce and Defense work closely together and almost always agree on the final disposition of a license application.

Question. Has the Department of Defense ever complained that a license was not submitted for its review which should have been?

Answer. The only instance we are aware of was a March, 1979 case for aircraft transceivers that was inadvertently submitted to COCOM without Defense concurrence. The case was withdrawn from COCOM, was referred to Defense and is currently undergoing interagency review in which Defense is a major participant. This has not been a problem in the past and we will make every effort to ensure that this situation does not recur in the future.

Question. Are your export license files available for review by the FBI, DIA, or CIA?

Answer. We have no outstanding request for review of our export license files by any of these agencies. However, the CIA sits on the Operating Committee as an advisory agency and receives the same material on each case as does Defense. We assume that Defense coordinates with DIA as it feels appropriate.

Question. Would you have any objection to DIA or CIA reviewing your files regarding illegal diversion so that the agencies involved could better assess the technology transfer to Russia in important R&D projects under way in Russia?

Answer. Upon receipt of specific requests, we have provided such information to these agencies. We have begun to work with the CIA on procedures to facilitate their access to export administration data in a manner consistent with the applicable statutory provisions (section 12(c)) of the Export Administration Act.

Question. Is there a current policy against such general review?

Answer. No. Upon receipt of specific requests, we have provided such information to these agencies. As we noted in our answer to the previous question, we have begun working with the CIA on procedures to facilitate their access to export administration data in a manner consistent with the applicable provisions of the Export Administration Act.

Question. What is the statutory basis for the policy, and please explain in detail why you feel that the statute must be interpreted in the fashion you state?

Answer. As stated above, we have no such policy. We respond to specific requests from the intelligence agencies and the FBI for access to our files.

Question. Has the Office of Export Administration ever refused access to its compliance files or its validated license files when review was requested by the General Accounting Office of the Congress?

Answer. The Commerce Department fully cooperates with the GAO and, subject to the provisions of applicable law, provides records requested by GAO.

Question. Would you object to providing information copies to DOD for all validated export license applications submitted with respect to Russia, the Warsaw Pact, or Mainland China?

Answer. No.

Question. Would the submission to the Department of Defense of information copies of license applications allow the Department of Defense to assist the Department of Commerce in insuring that all licenses which should receive a specific DOD review do, in fact, receive DOD review?

Answer. We have no indication from Defense that they believe such a procedure would be appropriate or useful from their point of view. If Defense so requests, however, they woud be welcome to receive copies of any license applications they wish.

Question. What harm would there be in providing all relevant export data to the Department of Defense in addition to specific requests for review of particular cases?

Answer. Again, we are quite willing to provide to Defense any additional information they feel appropriate or useful from their point of view. Defense, of course, routinely receives all relevant export data that we receive with respect to a particular export license application. If they or we feel that more information is needed, we obtain the additional information from the applicant. Further, as stated in response to an earlier question, Defense and Commerce

have an understanding as to what Defense wishes to see in the way of commodities and technical data, and Defense routinely receives every application that falls within this understanding. Should they wish to have this understanding modified, we are quite prepared to do so.

Question. Thirty-six array transform processors have apparently been licensed for export to Russia and Mainland China. These high technology items are important to advanced anti-submarine warfare. Were any license applications involved submitted to DOD for review, and if so, what was the recommendation of DOD?

Answer. All license applications involving array transform processors are referred to Defense for review. Those that have been licensed were approved by Defense.

QUESTIONS SUBMITTED BY SENATOR HARRY F. BYRD, JR., ANSWERS SUPPLIED BY SHARON R. CONNELLY, DIRECTOR OF THE COMPLIANCE DIVISION, OFFICE OF EXPORT ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE

Question. How many cases of illegal diversion have been presented to your division since 1972?

Answer. [Deleted.]

Question. How many of these cases involve Russia or Warsaw Pact nations?

Answer. [Deleted.]

Question. What is the present backlog in processing illegal diversion cases or export impoundments?

Answer. [Deleted.]

Question. Is your staff adequate to process and investigate information given to your office respecting illegal diversions?

Answer. [Deleted.]

Question. Would your job of insuring compliance with export license decisions of the Department of Commerce be assisted by permitting the Department of Defense access to your illegal diversion records?

Answer. [Deleted.]

Question. In other words, would such access help you in assessing which cases of illegal diversion were of greatest importance from a major national security perspective and in obtaining information through the DIA, FBI, or CIA which might assist you in taking action against a violator?

Answer. [Deleted.]

Question. Please explain any objection you would have to having the active help and involvement of the investigative agencies of other departments of government.

Answer. [Deleted.]

Question. Please provide for the record a synopsis of illegal diversion cases involving Communist Bloc nations which have been reported to your office during 1979?

Answer. [Deleted.]

Question. Now that Kama River trucks and other Kama River military vehicles have been used in the invasion of Afghanistan, in your professional judgment, has there been diversion of the end-use products of the Kama facility.

Answer. The U.S. Government's decision in 1971 to license exports to the Kama plant in the U.S.S.R. appears to have been principally a political-economic decision. Once it had been decided at the highest levels of the government to authorize exports to Kama, licensing decisions were made on the basis of whether the commodity or technical data to be exported was appropriate for the production of civilian trucks—not how the civilian trucks would be used. In 1979, information was first received by the Commerce Department that Kama trucks were being used by the Soviet military. The possibility of such a use was foreseen when the 1971 decision was made. The end-use of some of the Kama trucks may be contrary to the purpose of Kama, as it appears to have been understood by U.S. government officials at the time the decision was made to participate in the Kama project. However, no evidence has been discovered of any Soviet certification or representation *not* to make use of the Kama trucks by the Soviet military. Evidence of any commitment to use Kama trucks for only civilian purposes is not sufficient to warrant enforcement action against any Soviet entity under the provisions of Part 387 of the Export Administration Regulations. Furthermore, no violation on the part of any U.S. firm was detected during the investigation.

Question. Please provide for the record all end-use statements involving the Kama facility.

Answer. End-use statements are retained in committee files.

QUESTION SUBMITTED BY SENATOR HARRY F. BYRD, JR., ANSWER SUPPLIED BY JOSEPH LUCCIOLA, DEPUTY DIRECTOR, COMPLIANCE DIVISON, OFFICE OF EXPORT ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE

Question. In testimony given to the Subcommittee, it has been stated that representatives of IBM were permitted to visit the Kama River plant to determine if diversions of computer time are occurring. Please describe the restrictions placed on such visiting personnel and state whether, in your professional judgment, you feel that the inspections permitted are adequate to guarantee non-diversions?

Answer. To the best of my knowledge the Soviets have not hindered IBM representatives from performing their responsibilities under the safeguards agreement signed by Soviet and IBM representatives before the computer was installed. Those responsibilities include that IBM representatives perform certain checks designed to identify diversion of computer time. With respect to the adequacy of the safeguard inspections, I must defer to the judgment of the interagency panel of technical experts who devised the system of inspections for that installation and apparently determined, before the export was licensed, that the inspections would be adequate to monitor the computer s use. However, the safeguards agreement also contained provisions which could not necessarily be verified by the inspection system. The inspection system appears to have been primarily designed to prevent diversion of the computer hardware and diversion of computer time directly to military ends, but the safeguards also required the Soviet end-user to report to IBM significant changes in the computer's application or other facts on which the license was based. This appears not to have been done.

QUESTIONS SUBMITTED BY SENATOR HARRY F. BYRD, ANSWERS SUPPLIED BY ELLEN L. FROST, DEPUTY ASSISTANT SECRETARY, INTERNATIONAL ECONOMIC AFFAIRS, DOD

Question. "Policy Review Memorandum 24 sets forth policy respecting trade with China. The President has announced a liberalized policy of the sale of military technology to China in conjunction with his apparent decision to cut down such trade with Russia. Is there any change in the present policy and the general policy already established in PRM–24?"

Answer. Our current policy is that (1) the U.S. will not sell arms to China; (2) the U.S. is prepared to consider, on a case-by-case basis, the sale of certain carefully selected items of military support equipment, e.g. trucks, communications gear, and certain types of early warning radar; and, (3) the U.S. is prepared to sell to the Chinese certain civilian technology which we would not approve for sale to the Soviet Union. This policy is not linked to the Soviet invasion of Afghanistan and the President's subsequent decision to restrict technology exports requiring validated licenses to the U.S.S.R.

Question. "In view of your experience with Russia—I think it is at this point safe to say that U.S. exports have assisted in building up the Russian war machine—do you think there is a danger of repeating the same mistake during a period of detente with China?"

Answer. Export licenses for China are carefully considered on a case-by-case basis and this procedure will preclude any significant transfers to China that would be detrimental to our national security and that of our allies.

Question. "In formulating trade policy toward China, how are your recommendations taken into account?

"In other words, what role has the Department of Defense played in creating the new policy of liberal technology export and transfer to Mainland China?"

Answer. The Defense Department at the top policy levels was fully consulted, involved and supportive of the President's decision to liberalize technology exports to China.

Question. "It is the current policy of DOD to approve license applications for export to Mainland China of mini-computers which could be used in missile guidance systems or large-scale computers which could be used in nuclear weapons design?"

Answer. The answer to this question is a most emphatic, no. We do not approve commercial license applications to export equipment for these purposes to any nation.

QUESTIONS SUBMITTED BY SENATOR HARRY F. BYRD, ANSWERS SUPPLIED BY VITALIJ GARBER, DEPUTY UNDER SECRETARY OF DEFENSE, INTERNATIOAL PEOGRAMS AND TECHNOLOGY

Question. What new steps have you taken to implement the announced policy of the Administration to embargo high technology transfer to Russia?

Answer. We have suspended all export licenses pending review and have recommended restrictive criteria to our COCOM partners in computer and electronics technology. Further, we have greatly restricted visits and exchanges by technical personnel.

Question. Is it your present understanding that the embargo extends only to Russia, or does it include Warsaw Pact nations?

Answer. While the embargo extends only to U.S.S.R., it does naturally impact on other Warsaw Pact nations. It is necessary to conduct more deliberate and detailed examination of cases for the other Warsaw Pact countries to preclude these nations from becoming a conduit for technical data, spare parts and equipment to the U.S.S.R.

Question. Is there any advantage from a military point of view in stopping high technology transfer to Russia if the same transfers are permitted, for example, to East Germany? Please explain.

Answer. No, continuing to export high technology to East Germany would be counter productive if the items in question are not already available to the Soviet Union.

Question. How many license applications for export to Russia or Warsaw Pact nations have been submitted to the Department of Defense for review since the new policy was announced?

Answer. During the period from January 8 to August 31, 1980, there were 101 U.S.S.R. license applications—remainder of Bloc—600 license applications. Another 300 plus U.S.S.R. cases have been reviewed to check end-users (These cases would not otherwise be reviewed by DOD).

Question. Has the Department of Commerce complied with the recommendations of the Department of Defense with respect to the Zil automotive facility?

Answer. Commerce has denied all validated license requests for Zil. DOD and DOC are investigating what additional items need to be placed under validated license procedures.

Question. In reviewing export licenses submitted to DOD, do you thereafter refer to the licensing applications to the Services for further review?

Answer. Yes, license applications are routinely submitted to the Services and, depending upon the item, to the Defense Intelligence Agency and the National Security Agency.

Question. What would the objection be to submitting to all three Services all Commerce requests for review? Would that not insure that the full expertise of the Department of Defense was obtained?

Answer. On all major issues and areas where Services have specific interests and expertise requests are being forwarded. Review of all license applications by each service would be unnecessary and burdensome on the administration of the program.

Question. Who determines which Service reviews which export license cases referred to DOD?

Answer. In dual-use technology export cases, the office of International Programs and Technology determines distribution to the services. This is predicated on service interests and expertise in the given area. For example, applications for Array Transform Processors, which are pertinent to ASW, go to the Navy for review, but NSA is the second agency that is particularly concerned with this type equipment.

Question. Do you believe it would be to the advantage of the Department of Defense in assessing a particular license application if DOD were aware of illegal diversion of related technology?

Answer. Of course, it is a key element in case review.

Question. In other words, in assessing the impact of a particular license, would it not assist you to know of any illegal diversion of a related technology?

Answer. Yes, and we rely heavily on the intelligence community for such assistance. Further, my office has established a very close relationship with DIA to enhance our awareness in this regard. DIA's participation in the case review

process has been increased by a factor of ten since last November/December time frame to enable that agency not only to be aware of but also to be more responsive to the entire export program.

Question. Do you favor access for the DOD to all Commerce files regarding validated export licenses and cases of alleged illegal diversion? Please explain. Access, as I am using the term, would not imply the necessity of full review of each case.

Answer. Yes, and I believe that such access, for the most part, does exist. Defense is able to obtain all the information necessary to review validated licenses. The Department of Commerce has revitalized their Compliance Division in the last year. While it is not their practice to provide direct reports of all their investigations, Defense has received information pertinent to diversion cases wherein it impacted on cases currently under process. Defense also receives indirect information through message traffic relating to ongoing investigations.

Question. Would you object to receiving an information copy or a synopsis notification of all validated export license applications for export to Russia, the Warsaw Pact, or Mainland China?

Answer. Not at all; we would welcome such information. It is our objective in working the problem with DOC to plan such information in computer so that we can share the data bank.

Question. Do you believe that the role of the Department of Defense, in examining an export license request, should be expanded? I would appreciate your best professional judgment in answering.

Answer. No, I believe that the role provided for DOD in the Export Administration Act of 1979 ensures that U.S. National Security interests are safeguarded. DOD has worked out good arrangements with the Departments of State, Commerce and Energy as well as the National Intelligence Community. It will always be important to provide DOD, and the other agencies, adequate personnel and resources to carry out the export control function. A major problem still exists due to the split in jurisdiction over specific exports; i.e., State Department for munitions, Commerce for dual-use and the Nuclear Regulatory Agency for nuclear-related products. Since there is some duplication and overlap among the control lists, the actions by one agency can impact significantly on the actions of the other. While the delineation of responsibility is correct, the governing regulations, their interpretation and implementation must be consistent. A concerted effort should be made to eliminate the duplication and overlap in the controls, but of equal impact is the requirement to foster consistency in the regulations and licensing procedures. In developing legislation, the various Congressional Committees should take these matters under consideration.

In summary, Senator Byrd, I am confident that our procedures for export control are appropriate and workable.

QUESTIONS SUBMITTED BY SENATOR STROM THURMOND, ANSWERS SUPPLIED BY VITALIJ GARBER, DEPUTY UNDER SECRETARY OF DEFENSE, INTERNATIONAL PROGRAMS AND TECHNOLOGY, OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING, DEPARTMENT OF DEFENSE

Question. Under Public Law 96–72, the Export Administration Act of 1979, the Department of Defense has "primary responsibility" to develop a list of military critical technologies, emphasizing goods currently not possessed by countries subject to export controls, which would permit a major advance of such countries weapons systems. Since the enactment of this law, has the Defense Department been able to function in its "primary responsibility" role?

Answer. Yes. The Department of Defense has been able to function in this role as a part of our overall effort to establish and maintain technological lead over potential adversaries.

Question. Can you describe the interfaces among the Department of Commerce, Department of Defense and the State Department in deriving the list of military critical technologies?

Answer. The State Department and Commerce Department play an advisory role to the Defense Department in the derivation of the list of critical technologies. The extent of the interface between these agencies and DOD will increase as the program proceeds from the development of a list to its implementation in export control. In the initial phase State Department representatives

attend meetings and review critical technology reports; advising DOD and industry technologists on the international export control process and current control coverage. The Commerce Department participation in this phase includes advising on export control regulation and on technological guidelines currently followed in reviewing license applications. Commerce technologists also participate on the groups established to identify critical elements in specific technological areas. Commerce advises on the technological specificity required for list items to be useful as guidelines in export control. In subsequent phases of this program, Commerce will work with the list to develop the necessary regulations to implement national controls while the State Department will assist in formatting the list as appropriate for adoption into COCOM international controls.

Question. The 1979 Export Administration Act requires a list of military critical technologies to be completed and published no later than October 1, 1980. Exactly who is preparing this list and when will it be issued?

Answer. The program for development of the List is directed by the Office of the Deputy Under Secretary of Defense for International Programs and Technology (IP&T). The List is derived by merging the independent efforts of the Institute of Defense Analysis (IDA) and the Services. The effort headed by IP&T includes the direct participation of approximately 100 industry and over 120 military service technologists. A key input to this development is the previous efforts of groups sponsored by industry associations.

List of Military Critical Technologies

Senator Thurmond. What steps have been taken to prevent leakage of critical military technology to our adversaries through military export to a third country?

Dr. Garber. If the item in question is exclusively a military device, it would be subject to ITAR under State Department Munitions Control. The Defense Department is the primary advisor to State Department on all license requests so the potential for leakage of critical military technology through this avenue is considered minimal. If the item involves a dual-use technology; i.e., one with commercial as well as military application, it is subject to Commerce export regulations. If the item has military application, Commerce requests Defense review and comment. The Defense criteria for granting export licenses include determination that such goods, technical data, or test equipment would not confer new or significant capability to potential adversaries if such exports were to be reexported legally or illegally. In assessing the potential impact of technology exports that might find their way to an adversary we use the full resources of the military departments, the intelligence community, and the Technical Advisory Committees of the Department of Commerce. The latter have special qualifications in assessing availability in foreign markets of material equivalent to that for which export licenses are being requested.

Senator Thurmond. Has the $2,500,000 appropriated to the Defense Department been adequate to carry out its function of "primary responsibility" for military critical technologies?

Dr. Garber. We are grateful for the $2,500,000 appropriation that assists DoD in meeting its primary responsibilities with respect to developing the list of military critical technologies. This amount is adequate to allow my Project Office to function as I have described in my testimony. The military departments, the other Federal Agencies, and private industry are matching that appropriation with donated personnel resources. Inasmuch as I believe that the methodology that we are developing in our Critical Technologies Project will apply in time, to all forms of military technology sharing and export—that is to items now on the munitions list, the atomic energy list, or considered for sharing with our allies to build their eventual capabilities—I think it prudent that we recognize the resource requirements and budget for them appropriately in the future.

Senator Thurmond. What is the Defense Department estimate for this function in the FY81 budget request?

Dr. Garber. DoD is again requesting $2.5 million to support the Office of the Deputy Under Secretary of Defense Research and Engineering (International Programs and Technology).

Senator Thurmond. Is the Defense Department happy with their current role in the Export Administration Act?

Dr. GARBER. The role assigned to the Defense Department in the Export Administration Act of 1979 is an appropriate one. I believe that we have the authority necessary to protect U.S. military technological leads.

Senator THURMOND. Does the Defense Department desire more responsibility to fulfill their role in defense export issues?

Dr. GARBER. Under the Export Administration Act of 1979, the Department of Defense is assured a strong voice in the resolution of defense export issues. I believe that the processes that we employ with the other Federal agencies for consultation and coordination in addition to the legal mandate of the Export Administration Act are adequate to ensure our capability to discharge our responsibilities.

Senator THURMOND. Would the Defense Department recommend any changes to the 1979 Export Administration Act?

Dr. GARBER. At the present time I do not see any major changes that we might desire. There is a possibility that some language in the act with respect to our responsibility to inform license applicants in detail of the reasons for denial of licenses may have to be clarified so as to protect military security aspects of such decisions. I believe that we should live with the Act for a while longer before seeking changes.

Senator THURMOND. Have there been any conflicts between the desire to decrease our balance of payments, and trade deficit and the necessity to maintain national security through limited military technology exports?

Dr. GARBER. Of course. We in the Department of Defense support the basic policies of the United States Government to stimulate trade. Civil-use products of high technology are some of the things most sought in the international market place. It is the DoD responsibility to examine carefully such exports and recommend that sales that are not in the national security interest be denied. Conflict arises when individuals or agencies that lack the national security perspective fail to understand the necessity to subordinate goals of redressing balance of payments or trade deficits to national security.

Senator THURMOND. Is consideration being given to potential strategic technology as well as significant combat equipment?

Dr. GARBER. Yes. The consideration of strategic technology is what drives the process of developing the lists of military critical technologies. I might add that significant combat equipment is not a problem for control since such is covered by the Munitions List and can be unilaterally embargoed.

Senator THURMOND. Is the Defense Department satisfied that the Security Assistance Act, the Arms Export Control Act, the State Department Munitions List and the 1979 Export Administration Act are all in concert?

Dr. GARBER. The International Security Assistance and Arms Export Control Act concerns the export of defense articles and defense services. These items constitute primarily military hardware and related technical data and are controlled under the U.S. Munitions List. These items may be provided either via commercial sales of FMS. The Export Administration Act provides control over dual use items. Although there are no apparent jurisdictional conflicts, some overlaps do occur, but there are also some problems of uniformity in the application of limitations on like or similar equipment. Although these variations in interpretation or enforcement do arise, it is our belief that the methodology for defining military equipment and services developed under the critical technology review will resolve this problem. In this manner our national security interests would be insured and uniform criteria would be applied.

QUESTIONS SUBMITTED BY SENATOR STROM THURMOND, ANSWERS SUPPLIED BY SHARON R. CONNELLY, DIRECTOR, COMPLIANCE DIVISION, OFFICE OF EXPORT ADMINISTRATION, DEPARTMENT OF COMMERCE

Question. Does the recent embargo on technology sales to the Soviet Union include an embargo on spare parts, especially spare parts for computer systems which have been sold in previous years to the Soviet Union?

Answer. Yes. All commodities requiring validated export licenses or other specific authorizations from the Department of Commerce for shipments to the USSR, including validated-license spare parts for products previously exported, were subject to the moratorium of exports directly by the President pending review of our policy on exports to the Soviet Union. Outstanding licenses and

applications for such licenses will be reviewed on a case-by-case basis to determine whether they meet new, stricter criteria announced by the Department of Commerce March [illegible], 1980.

Question. Are there any sales of spare parts to the Soviet Union currently being made for which it has been determined that the spare parts do not require an export license?

Answer. Yes. General License export privileges remain in effect. (Goods determined not to contribute significantly to the Soviet military potential to the detriment of the U.S. national security and not controlled for foreign policy purposes are exportable to the USSR under the provisions of a General License.)

Question. If so, please list those items.

Answer. Spare parts which require a validated license for export to the USSR are listed on the Commodity Control List in section 399.1 of the Export Administration Regulations. Commodities not requiring a validated license may be exported under a general license. Under limited conditions U.S.-origin commodities previously exported from the U.S. to the USSR under a validated license or other specific authorization that are returned to the U.S. for servicing may be returned to the USSR under a general license. Similar general license export privileges apply to certain warranty repairs within one year after the export of equipment under validated license.

Senator BYRD. I want to thank each of you again.

The committee stands in adjournment.

[Whereupon, at 12:15 p.m., the subcommittee was adjourned, subject to the call of the Chair.]

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